```
#### Biost 518: Applied Biostatistics II
#### Emerson, Winter 2007

#### Homework #4 Key
#### Annotated Stata Log File
#### March 7, 2007

#### The following output was used to generate the numbers that I wanted to present
#### in tables, as well as the plots I wanted to present as figures in the paper.
#### I note that Stata does not present its output in a form suitable for presentation.
#### Numbers need to be rounded to an interesting number of significant digits, and
#### the columns and rows need to facilitate comparison of relevant measures.
#### I used Excel to manipulate this output into the form I wanted, then copied the
#### resulting tables to the MS-Word document.

#### Comments edited into the log file produced by Stata are
#### on the lines that start with the four '#' signs and are
#### printed in italics.

#### The Stata commands are put in bold face.

#### Stata output is displayed in regular typeface in blue.

#### Read in data. I use a dataset previously created in "wide" format.
. infile age male wt bmi chol pctfat dose carot0 carot1 carot3 cauc vite0 vite1
vite3 vauc using carot.txt

#### Creating variables to model threshold (tx) and polynomials (dosesqr, dosecub,
#### dosefourth)

. g dosesqr= dose * dose
. g dosecub= dose ^3
. g dosefourth= dose^4
. g tx= dose
. recode tx 0=0 0.01/max=1
(tx: 38 changes made)


#### Problem 1
#### Descriptive statistics

. format carot3 %7.0f
. tabstat carot3, col(stat) stat(n mean sd min p25 p50 p75 max) by(dose) format

Summary for variables: carot3
     by categories of: dose

    dose |   N   mean     sd       min       p25       p50       p75       max
---------+--------------------------------------------------------------------
       0 |   7    186     88        85       126       149       286       323
      15 |   8   1254    570       577       695      1250      1771      2019
      30 |   9   1505    479       849      1157      1499      1840      2249
      45 |   7   1749    579       950       993      1848      2248      2310
      60 |   9   1878    430      1233      1725      1865      1918      2855
---------+--------------------------------------------------------------------
   Total |  40   1350    734        85       800      1529      1915      2855
------------------------------------------------------------------------------

#### Six regressions with fitted values estimated after each one.
#### Note that in every case I can get the test of the plasma level - dose association
```

from the overall F test.

```
. xi: regress carot3 i.dose, robust
i.dose            _Idose_0-60         (naturally coded; _Idose_0 omitted)

Linear regression                                      Number of obs =      40
                                                       F(  4,    35) =   62.42
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6364
                                                       Root MSE      =  467.52

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   _Idose_15 |   1067.262   204.3474     5.22   0.000     652.4147    1482.109
   _Idose_30 |    1318.29   164.2547     8.03   0.000     984.8348    1651.745
   _Idose_45 |    1562.76    219.091     7.13   0.000     1117.981    2007.538
   _Idose_60 |   1691.308   148.1136    11.42   0.000     1390.622    1991.995
       _cons |   186.3214   32.84404     5.67   0.000     119.6445    252.9984
------------------------------------------------------------------------------

. predict fitB
(option xb assumed; fitted values)

. regress carot3 dose, robust

Linear regression                                      Number of obs =      40
                                                       F(  1,    38) =   48.94
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.5198
                                                       Root MSE      =   515.6

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |   24.84078   3.550861     7.00   0.000     17.65244    32.02912
       _cons |    577.247   139.1724     4.15   0.000     295.5071    858.9869
------------------------------------------------------------------------------

. predict fitC
(option xb assumed; fitted values)

. regress carot3 dose dosesqr, robust

Linear regression                                      Number of obs =      40
                                                       F(  2,    37) =   64.59
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6135
                                                       Root MSE      =  468.82

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |   60.91424   9.577685     6.36   0.000     41.50801    80.32048
```

```
------------------------------------------------------------------------------
      dosesqr |  -.5843937   .1672511    -3.49   0.001    -.9232767   -.2455107
        _cons |   279.5512   83.19127     3.36   0.002     110.9897    448.1127
------------------------------------------------------------------------------

. predict fitD
(option xb assumed; fitted values)

. regress carot3 tx, robust

Linear regression                                      Number of obs =      40
                                                       F(  1,    38) =  195.74
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.5465
                                                       Root MSE      =  501.08

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |   1411.024   100.8532    13.99   0.000     1206.857    1615.191
       _cons |   186.3214   31.52091     5.91   0.000     122.5107    250.1322
------------------------------------------------------------------------------

. predict fitE
(option xb assumed; fitted values)

. regress carot3 tx dose, robust

Linear regression                                      Number of obs =      40
                                                       F(  2,    37) =  127.47
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6348
                                                       Root MSE      =  455.71

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |   883.6489   222.9229     3.96   0.000     431.9642    1335.334
        dose |   13.97862   5.053818     2.77   0.009     3.738611    24.21863
       _cons |   186.3214   31.94403     5.83   0.000     121.5967    251.0462
------------------------------------------------------------------------------

. predict fitF
(option xb assumed; fitted values)

. regress carot3 dose dosesqr dosecub dosefourth, robust

Linear regression                                      Number of obs =      40
                                                       F(  4,    35) =   62.42
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6364
                                                       Root MSE      =  467.52

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
        dose |   131.6687   65.77323     2.00   0.053    -1.858029    265.1955
     dosesqr |  -5.485252   5.640056    -0.97   0.337    -16.93517    5.964671
     dosecub |    .108061    .151224     0.71   0.480      -.19894    .4150621
  dosefourth |  -.0007564   .0012633    -0.60   0.553    -.0033211    .0018082
       _cons |   186.3214   32.84404     5.67   0.000     119.6445    252.9984
------------------------------------------------------------------------------
```

```
. predict fitG
(option xb assumed; fitted values)

#### Table of fitted means and plot of fitted values.
. tabstat carot3 fitB fitC fitD fitE fitF fitG, stat(mean) by(dose)

Summary statistics: mean
  by categories of: dose

    dose |    carot3      fitB      fitC      fitD      fitE      fitF      fitG
---------+--------------------------------------------------------------------
       0 |  186.3214  186.3214   577.247  279.5512  186.3214  186.3214  186.3214
      15 |  1253.583  1253.583  949.8587  1061.776  1597.345   1279.65  1253.583
      30 |  1504.611  1504.611   1322.47  1581.024  1597.345  1489.329  1504.611
      45 |  1749.081  1749.081  1695.082  1837.295  1597.345  1699.008  1749.081
      60 |   1877.63   1877.63  2067.694  1830.589  1597.345  1908.687   1877.63
---------+--------------------------------------------------------------------
   Total |  1350.416   1344.38  1338.671  1340.623   1351.95  1344.767   1344.38
------------------------------------------------------------------------------

. sort dose

. twoway (scatter carot3 dose, jitter(3) legend( label(1 "carot3"))) (line fitB
>   dose, col(red) legend( label(2 "ANOVA / 4th order poly"))) (line fitC dose,
>   col(blue) legend( label(3 "linear"))) (line fitD dose, col(green)
>   legend( label(4 "quadratic"))) (line fitE dose, col(yellow)
>   legend( label(5 "threshold"))) (line fitF dose, col(orange)
>   legend( label(6 "threshold-linear" )))


#### Problem 2
#### Six regressions of plasma beta carotene at 9 months adjusted for baseline.
#### Note that in several cases I have to use “test” or “testparm” to test
#### the dose effect, because in several models dose is modeled using several
#### predictors.

. xi: regress carot3 i.dose carot0, robust
i.dose            _Idose_0-60         (naturally coded; _Idose_0 omitted)

Linear regression                               Number of obs =      40
                                                F(  5,    34) =   47.68
                                                Prob > F      =  0.0000
                                                R-squared     =  0.7184
                                                Root MSE      =  417.46

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
   _Idose_15 |    1224.19   213.5586     5.73   0.000     790.1863    1658.193
   _Idose_30 |   1439.837   155.7948     9.24   0.000     1123.224     1756.45
   _Idose_45 |   1678.984   167.1502    10.04   0.000     1339.294    2018.674
   _Idose_60 |   1791.009    152.946    11.71   0.000     1480.185    2101.833
      carot0 |   1.902792   .5370015     3.54   0.001     .8114738     2.99411
       _cons |  -361.4516   167.5432    -2.16   0.038    -701.9404   -20.96285
------------------------------------------------------------------------------
```

. testparm _Idose*

```
 ( 1)  _Idose_15 = 0
 ( 2)  _Idose_30 = 0
 ( 3)  _Idose_45 = 0
 ( 4)  _Idose_60 = 0

       F(  4,    34) =   59.47
            Prob > F =    0.0000
```

. regress carot3 dose carot0, robust

```
Linear regression                               Number of obs =      40
                                                F(  2,    37) =   25.47
                                                Prob > F      =  0.0000
                                                R-squared     =  0.5622
                                                Root MSE      =  498.94

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |   25.46276   3.632547     7.01   0.000     18.10252      32.823
      carot0 |   1.334088    .657003     2.03   0.050     .0028737    2.665303
       _cons |   245.0003    222.814     1.10   0.279    -206.4638    696.4644
------------------------------------------------------------------------------
```

. regress carot3 dose dosesqr carot0, robust

```
Linear regression                               Number of obs =      40
                                                F(  3,    36) =   59.30
                                                Prob > F      =  0.0000
                                                R-squared     =  0.6824
                                                Root MSE      =  430.81

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |   67.14673   8.207062     8.18   0.000     50.50203    83.79142
     dosesqr |  -.6723087   .1451496    -4.63   0.000    -.9666857   -.3779317
      carot0 |   1.728068   .5638738     3.06   0.004     .5844789    2.871657
       _cons |  -195.5986     179.34    -1.09   0.283    -559.3169    168.1197
------------------------------------------------------------------------------
```

. test dose dosesqr

```
 ( 1)  dose = 0
 ( 2)  dosesqr = 0
```

```
       F(  2,    36) =   84.56
            Prob > F =    0.0000
```

. regress carot3 tx carot0, robust

```
Linear regression                                      Number of obs =      40
                                                       F(  2,    37) =   84.00
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6434
                                                       Root MSE      =   450.3

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |    1544.22   120.0337    12.86   0.000     1301.009    1787.432
      carot0 |   2.059907   .7091411     2.90   0.006     .6230503    3.496763
       _cons |  -406.6816   215.3205    -1.89   0.067    -842.9623    29.59912
------------------------------------------------------------------------------
```

. regress carot3 tx dose carot0, robust

```
Linear regression                                      Number of obs =      40
                                                       F(  3,    36) =   81.26
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.7170
                                                       Root MSE      =  406.69

------------------------------------------------------------------------------
             |               Robust
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |   1050.836    223.418     4.70   0.000     597.7237    1503.949
        dose |   12.81144   4.794314     2.67   0.011     3.088122    22.53476
      carot0 |   1.904584   .5164903     3.69   0.001     .8570932    2.952075
       _cons |  -361.9675   161.4254    -2.24   0.031    -689.3534   -34.58168
------------------------------------------------------------------------------
```

. test tx dose

```
 ( 1)  tx = 0
 ( 2)  dose = 0

       F(  2,    36) =  121.88
            Prob > F =    0.0000
```

. regress carot3 dose dosesqr dosecub dosefourth carot0, robust

```
Linear regression                                      Number of obs =      40
                                                       F(  5,    34) =   47.68
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.7184
                                                       Root MSE      =  417.46

------------------------------------------------------------------------------
             |               Robust
```

```
      carot3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |    157.876   61.94333     2.55   0.015     31.99197    283.7599
     dosesqr |  -6.943753   5.066692    -1.37   0.180    -17.24051    3.353004
     dosecub |   .1385695   .1313523     1.05   0.299    -.1283706    .4055096
  dosefourth |  -.0009734   .0010718    -0.91   0.370    -.0031515    .0012047
      carot0 |   1.902792   .5370015     3.54   0.001     .8114738     2.99411
       _cons |  -361.4516   167.5432    -2.16   0.038    -701.9404   -20.96285
------------------------------------------------------------------------------

. testparm dose*

 ( 1)  dose = 0
 ( 2)  dosesqr = 0
 ( 3)  dosecub = 0
 ( 4)  dosefourth = 0

       F(  4,    34) =   59.47
            Prob > F =    0.0000

#### Problem 3
#### Six regressions of plasma vitamin E at 9 months adjusted for baseline.
#### Note that in several cases I have to use "test" or "testparm" to test
#### the dose effect, because in several models dose is modeled using several
#### predictors.

. xi: regress vite3 i.dose vite0, robust
i.dose            _Idose_0-60         (naturally coded; _Idose_0 omitted)

Linear regression                                      Number of obs =      40
                                                       F(  5,    34) =   12.34
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4610
                                                       Root MSE      =  .82679

------------------------------------------------------------------------------
             |               Robust
       vite3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   _Idose_15 |  -1.236714   .3032359    -4.08   0.000    -1.852963   -.6204641
   _Idose_30 |  -.8365793   .4517968    -1.85   0.073    -1.754741    .0815823
   _Idose_45 |  -1.197252   .3791971    -3.16   0.003    -1.967874   -.4266311
   _Idose_60 |  -1.017331   .4029084    -2.52   0.016    -1.836139   -.1985225
       vite0 |   .4242351   .0990462     4.28   0.000     .2229491    .6255211
       _cons |   3.810029   .8936753     4.26   0.000     1.993862    5.626196
------------------------------------------------------------------------------

. testparm _Idose*

 ( 1)  _Idose_15 = 0
 ( 2)  _Idose_30 = 0
 ( 3)  _Idose_45 = 0
 ( 4)  _Idose_60 = 0

       F(  4,    34) =    4.46
            Prob > F =    0.0053
```

```
. regress vite3 dose vite0, robust

Linear regression                                      Number of obs =      40
                                                       F(  2,    37) =   11.82
                                                       Prob > F      =  0.0001
                                                       R-squared     =  0.3530
                                                       Root MSE      =  .86828

------------------------------------------------------------------------------
             |               Robust
       vite3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |  -.0123775   .0063056    -1.96   0.057     -.025154    .0003989
       vite0 |   .4683654    .103125     4.54   0.000     .2594143    .6773164
       _cons |    2.96794   .8238962     3.60   0.001     1.298567    4.637312
------------------------------------------------------------------------------

. regress vite3 dose dosesqr vite0, robust

Linear regression                                      Number of obs =      40
                                                       F(  3,    36) =   10.59
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4015
                                                       Root MSE      =  .84664

------------------------------------------------------------------------------
             |               Robust
       vite3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |  -.0496327   .0225195    -2.20   0.034    -.0953043    -.003961
     dosesqr |   .0006067   .0003677     1.65   0.108     -.000139    .0013525
       vite0 |   .4454083   .0922862     4.83   0.000     .2582431    .6325734
       _cons |   3.454686   .7626554     4.53   0.000      1.90795    5.001423
------------------------------------------------------------------------------

. test dose dosesqr

 ( 1)  dose = 0
 ( 2)  dosesqr = 0

       F(  2,    36) =    4.23
            Prob > F =    0.0223

. regress vite3 tx vite0, robust

Linear regression                                      Number of obs =      40
                                                       F(  2,    37) =   23.43
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4413
                                                       Root MSE      =  .80687

------------------------------------------------------------------------------
             |               Robust
       vite3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |  -1.059032    .288191    -3.67   0.001    -1.642963   -.4751019
       vite0 |   .4268817   .0941708     4.53   0.000     .2360736    .6176898
```

```
       _cons |   3.788548   .8481851     4.47   0.000     2.069962    5.507134
------------------------------------------------------------------------------
```

. regress vite3 tx dose vite0, robust

```
Linear regression                                      Number of obs =      40
                                                       F(  3,    36) =   15.24
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4421
                                                       Root MSE      =  .81741

------------------------------------------------------------------------------
             |               Robust
       vite3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |   -1.13388   .3856402    -2.94   0.006    -1.915995   -.3517653
        dose |   .0019646   .0073617     0.27   0.791    -.0129656    .0168948
       vite0 |   .4213962   .0921142     4.57   0.000     .2345798    .6082125
       _cons |   3.833071   .8380691     4.57   0.000     2.133388    5.532754
------------------------------------------------------------------------------
```

. test tx dose

```
 ( 1)  tx = 0
 ( 2)  dose = 0

       F(  2,    36) =    6.71
            Prob > F =    0.0033
```

. regress vite3 dose dosesqr dosecub dosefourth vite0, robust

```
Linear regression                                      Number of obs =      40
                                                       F(  5,    34) =   12.34
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4610
                                                       Root MSE      =  .82679

------------------------------------------------------------------------------
             |               Robust
       vite3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |  -.2519413   .0934612    -2.70   0.011    -.4418773   -.0620054
     dosesqr |   .0165007   .0088696     1.86   0.072    -.0015246    .0345259
     dosecub |  -.0003924   .0002489    -1.58   0.124    -.0008982    .0001134
  dosefourth |   3.04e-06   2.11e-06     1.44   0.158    -1.25e-06    7.33e-06
       vite0 |   .4242351   .0990462     4.28   0.000     .2229491    .6255211
       _cons |   3.810029   .8936753     4.26   0.000     1.993862    5.626196
------------------------------------------------------------------------------
```

. testparm dose*

```
 ( 1)  dose = 0
 ( 2)  dosesqr = 0
 ( 3)  dosecub = 0
 ( 4)  dosefourth = 0

       F(  4,    34) =    4.46
```

```
            Prob > F =    0.0053

#### Problem 4
#### Six regressions on a dichotomized variable for decreased vitamin E
#### with predicted probabilities and odds from each model.
#### Note that my commands are all the same, except I substitute "logistic" for
#### "regress" and "dvite" for "vite3".
#### Note that in every case I can get the test of the plasma vit E - dose association
#### from the overall F test.

. g dvite= vite3 - vite0
(6 missing values generated)

. recode dvite min/-1.5=1 -1.499999/max=0
(dvite: 40 changes made)

. xi: logistic dvite i.dose, robust
i.dose            _Idose_0-60         (naturally coded; _Idose_0 omitted)

Logistic regression                               Number of obs   =         40
                                                  Wald chi2(4)    =       2.00
                                                  Prob > chi2     =     0.7360
Log pseudolikelihood = -26.626058                 Pseudo R2       =     0.0397

------------------------------------------------------------------------------
             |               Robust
       dvite | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   _Idose_15 |   4.166667   4.686263     1.27   0.204     .4596632     37.7692
   _Idose_30 |          2   2.172084     0.64   0.523     .2380068    16.80624
   _Idose_45 |   3.333333   3.824249     1.05   0.294     .3518169    31.58208
   _Idose_60 |      3.125   3.393881     1.05   0.294     .3718857    26.25975
------------------------------------------------------------------------------

. predict fit4b
(option p assumed; Pr(dvite))

. g ofit4b= fit4b / (1-fit4b)

. logistic dvite dose, robust

Logistic regression                               Number of obs   =         40
                                                  Wald chi2(1)    =       0.61
                                                  Prob > chi2     =     0.4337
Log pseudolikelihood = -27.413462                 Pseudo R2       =     0.0113

------------------------------------------------------------------------------
             |               Robust
       dvite | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |   1.012028   .0154574     0.78   0.434      .982181    1.042782
------------------------------------------------------------------------------

. predict fit4c
(option p assumed; Pr(dvite))

. g ofit4c= fit4c / (1-fit4c)
```

```
. logistic dvite dose dosesqr, robust

Logistic regression                                     Number of obs   =         40
                                                        Wald chi2(2)    =       0.93
                                                        Prob > chi2     =     0.6296
Log pseudolikelihood = -27.261754                       Pseudo R2       =     0.0167

------------------------------------------------------------------------------
             |               Robust
       dvite | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |   1.041662   .0570289     0.75   0.456     .9356753    1.159654
     dosesqr |   .9995348   .0008514    -0.55   0.585     .9978675    1.001205
------------------------------------------------------------------------------

. predict fit4d
(option p assumed; Pr(dvite))

. g ofit4d= fit4d / (1- fit4d)

. logistic dvite tx, robust

Logistic regression                                     Number of obs   =         40
                                                        Wald chi2(1)    =       1.43
                                                        Prob > chi2     =     0.2316
Log pseudolikelihood = -26.925192                       Pseudo R2       =     0.0289

------------------------------------------------------------------------------
             |               Robust
       dvite | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |          3   2.754949     1.20   0.232     .4959627    18.14653
------------------------------------------------------------------------------

. predict fit4e
(option p assumed; Pr(dvite))

. g ofit4e = fit4e / (1-fit4e)

. logistic dvite tx dose, robust

Logistic regression                                     Number of obs   =         40
                                                        Wald chi2(2)    =       1.44
                                                        Prob > chi2     =     0.4872
Log pseudolikelihood = -26.921641                       Pseudo R2       =     0.0290

------------------------------------------------------------------------------
             |               Robust
       dvite | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          tx |   3.203206   3.863134     0.97   0.334     .3013129    34.05273
        dose |   .9982654     .02068    -0.08   0.933     .9585451    1.039632
------------------------------------------------------------------------------

. predict fit4f
(option p assumed; Pr(dvite))
```

```
. g ofit4f = fit4f / (1 - fit4f)

. logistic dvite dose dosesqr dosecub dosefourth, robust

Logistic regression                                     Number of obs   =         40
                                                        Wald chi2(4)    =       2.00
                                                        Prob > chi2     =     0.7360
Log pseudolikelihood = -26.626058                       Pseudo R2       =     0.0397

------------------------------------------------------------------------------
             |               Robust
       dvite | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dose |   1.390918   .3836128     1.20   0.232     .8101057     2.38815
     dosesqr |   .9772462   .0219612    -1.02   0.306     .9351373    1.021251
     dosecub |   1.000555   .0005962     0.93   0.351     .9993876    1.001725
  dosefourth |   .9999957   4.95e-06    -0.87   0.385      .999986    1.000005
------------------------------------------------------------------------------

. predict fit4g
(option p assumed; Pr(dvite))

. g ofit4g = fit4g / (1- fit4g)

#### Tables of fitted probabilities and then fitted odds.
. tabstat dvite fit4b fit4c fit4d fit4e fit4f fit4g, stat(mean) by(dose)

Summary statistics: mean
  by categories of: dose

    dose |     dvite     fit4b     fit4c     fit4d     fit4e     fit4f     fit4g
---------+--------------------------------------------------------------------
       0 |  .2857143  .2857143  .4080167  .3506316  .2857143  .2857143  .2857143
      15 |      .625      .625  .4519421  .4728516  .5454546  .5552285      .625
      30 |  .4444444  .4444444  .4966294   .547226  .5454546  .5487884  .4444444
      45 |  .5714286  .5714286  .5413705  .5691156  .5454546   .542332  .5714286
      60 |  .5555556  .5555556  .5854543  .5393248  .5454546  .5358613  .5555556
---------+--------------------------------------------------------------------
   Total |        .5  .5023292  .4985947  .4989565  .5002823  .5005033  .5023292
------------------------------------------------------------------------------

. tabstat  ofit4b ofit4c ofit4d ofit4e ofit4f ofit4g, stat(mean) by(dose)

Summary statistics: mean
  by categories of: dose

    dose |    ofit4b    ofit4c    ofit4d    ofit4e    ofit4f    ofit4g
---------+--------------------------------------------------------------
       0 |        .4  .6892367  .5399579        .4        .4        .4
      15 |  1.666667  .8246249  .8969989       1.2  1.248345  1.666667
      30 |        .8  .9866077  1.208607       1.2  1.216255        .8
      45 |  1.333333  1.180409  1.320808       1.2   1.18499  1.333333
      60 |      1.25  1.412279  1.170727       1.2  1.154528      1.25
---------+--------------------------------------------------------------
   Total |   1.10942  1.025919  1.035858   1.06087  1.062418   1.10942
------------------------------------------------------------------------
```

```
#### Problem 5
#### Six regressions on a dichotomized variable for increased beta carotene
#### with predicted probabilities and odds from each model.
#### Note that everyone of these regressions fail, because dose is "too predictive"
#### of increased plasma beta carotene, as shown in the descriptive statistics
#### at the end.
. g dcarot= carot3 - carot0
(6 missing values generated)

. recode dcarot min/0=0 0.00000001/max=1
(dcarot: 40 changes made)

. xi: logistic dcarot i.dose, robust
i.dose            _Idose_0-60         (naturally coded; _Idose_0 omitted)

note: _Idose_15 != 0 predicts success perfectly
      _Idose_15 dropped and 8 obs not used

note: _Idose_30 != 0 predicts success perfectly
      _Idose_30 dropped and 9 obs not used

note: _Idose_45 != 0 predicts success perfectly
      _Idose_45 dropped and 7 obs not used

note: _Idose_60 != 0 predicts success perfectly
      _Idose_60 dropped and 9 obs not used


Logistic regression                               Number of obs   =          7
                                                  Wald chi2(0)    =       0.00
                                                  Prob > chi2     =          .
Log pseudolikelihood = -2.8708142                 Pseudo R2       =    -0.0000

------------------------------------------------------------------------------
             |               Robust
      dcarot | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
------------------------------------------------------------------------------

. logistic dcarot dose, robust

note: dose != 0 predicts success perfectly
      dose dropped and 33 obs not used


Logistic regression                               Number of obs   =          7
                                                  Wald chi2(0)    =       0.00
                                                  Prob > chi2     =          .
Log pseudolikelihood = -2.8708142                 Pseudo R2       =    -0.0000

------------------------------------------------------------------------------
             |               Robust
      dcarot | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
------------------------------------------------------------------------------

. logistic dcarot dose dosesqr, robust
```

```
note: dose != 0 predicts success perfectly
      dose dropped and 33 obs not used

note: dosesqr dropped due to collinearity

Logistic regression                                   Number of obs   =          7
                                                      Wald chi2(0)    =       0.00
                                                      Prob > chi2     =          .
Log pseudolikelihood = -2.8708142                     Pseudo R2       =    -0.0000

------------------------------------------------------------------------------
             |               Robust
      dcarot | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
------------------------------------------------------------------------------
```

. logistic dcarot tx, robust

```
note: tx != 0 predicts success perfectly
      tx dropped and 33 obs not used


Logistic regression                                   Number of obs   =          7
                                                      Wald chi2(0)    =       0.00
                                                      Prob > chi2     =          .
Log pseudolikelihood = -2.8708142                     Pseudo R2       =    -0.0000

------------------------------------------------------------------------------
             |               Robust
      dcarot | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
------------------------------------------------------------------------------
```

. logistic dcarot tx dose, robust

```
note: tx != 0 predicts success perfectly
      tx dropped and 33 obs not used

note: dose dropped due to collinearity

Logistic regression                                   Number of obs   =          7
                                                      Wald chi2(0)    =       0.00
                                                      Prob > chi2     =          .
Log pseudolikelihood = -2.8708142                     Pseudo R2       =    -0.0000

------------------------------------------------------------------------------
             |               Robust
      dcarot | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
------------------------------------------------------------------------------
```

. logistic dcarot dose dosesqr dosecub dosefourth, robust

```
note: dose != 0 predicts success perfectly
      dose dropped and 33 obs not used
```

```
note: dosesqr dropped due to collinearity
note: dosecub dropped due to collinearity
note: dosefourth dropped due to collinearity

Logistic regression                                     Number of obs   =          7
                                                        Wald chi2(0)    =       0.00
                                                        Prob > chi2     =          .
Log pseudolikelihood = -2.8708142                       Pseudo R2       =    -0.0000

------------------------------------------------------------------------------
             |               Robust
      dcarot | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
------------------------------------------------------------------------------
```

. table dose, co(mean dcarot)

```
------------------------
     dose | mean(dcarot)
----------+-------------
        0 |     .1428571
       15 |            1
       30 |            1
       45 |            1
       60 |            1
------------------------
```

. table dose dcarot

```
----------------------
          |   dcarot
     dose |    0     1
----------+-----------
        0 |    6     1
       15 |          8
       30 |          9
       45 |          7
       60 |          9
----------------------
```