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#### Biost 517: Applied Biostatistics I
#### Emerson, Fall 2005

#### Annotated Stata Log File: Homework #5
#### November 4, 2005

#### In this file I give the Stata commands I used to produce
#### the key to Homework #5. In order to properly format
#### a table useful to casual readers, I cut and pasted some
#### of the output into Excel.

#### 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.

-------------------------------------------------------------------------------
#### Open log file to save commands and results
. log using hw5Stata.log
       log:  C:\My Documents\teach\b517\f05\hw5Stata.log
  log type:  text
 opened on:   4 Nov 2005, 17:41:23

#### Reading in the data
. infile ptid female age dose put0 put6 put12 put15 spd0 spd6 spd12 spd15 spm0
> spm6 spm12 spm15 using ..\..\datasets\2005.09.26\dfmowide.txt
'ptid' cannot be read as a number for ptid[1]
'female' cannot be read as a number for female[1]
'age' cannot be read as a number for age[1]
'dose' cannot be read as a number for dose[1]
'put0' cannot be read as a number for put0[1]
'put6' cannot be read as a number for put6[1]
'put12' cannot be read as a number for put12[1]
'put15' cannot be read as a number for put15[1]
'spd0' cannot be read as a number for spd0[1]
'spd6' cannot be read as a number for spd6[1]
'spd12' cannot be read as a number for spd12[1]
'spd15' cannot be read as a number for spd15[1]
'spm0' cannot be read as a number for spm0[1]
'spm6' cannot be read as a number for spm6[1]
'spm12' cannot be read as a number for spm12[1]
'spm15' cannot be read as a number for spm15[1]
'NA' cannot be read as a number for put12[9]
'NA' cannot be read as a number for put15[9]
'NA' cannot be read as a number for spd12[9]
'NA' cannot be read as a number for spd15[9]
'NA' cannot be read as a number for spm12[9]
'NA' cannot be read as a number for spm15[9]
'NA' cannot be read as a number for put15[10]
'NA' cannot be read as a number for spd15[10]
'NA' cannot be read as a number for spm15[10]
'NA' cannot be read as a number for put12[12]
'NA' cannot be read as a number for spd12[12]
'NA' cannot be read as a number for spm12[12]
'NA' cannot be read as a number for put12[16]
'NA' cannot be read as a number for put15[16]
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'NA' cannot be read as a number for spd12[16]
'NA' cannot be read as a number for spd15[16]
'NA' cannot be read as a number for spm12[16]
'NA' cannot be read as a number for spm15[16]
'NA' cannot be read as a number for put6[18]
'NA' cannot be read as a number for spd6[18]
'NA' cannot be read as a number for spm6[18]
'NA' cannot be read as a number for put6[19]
'NA' cannot be read as a number for put12[19]
'NA' cannot be read as a number for put15[19]
'NA' cannot be read as a number for spd6[19]
'NA' cannot be read as a number for spd12[19]
'NA' cannot be read as a number for spd15[19]
'NA' cannot be read as a number for spm6[19]
'NA' cannot be read as a number for spm12[19]
'NA' cannot be read as a number for spm15[19]
'NA' cannot be read as a number for put6[21]
'NA' cannot be read as a number for put12[21]
'NA' cannot be read as a number for spd6[21]
'NA' cannot be read as a number for spd12[21]
'NA' cannot be read as a number for spm6[21]
'NA' cannot be read as a number for spm12[21]
'NA' cannot be read as a number for put6[39]
'NA' cannot be read as a number for put12[39]
'NA' cannot be read as a number for put15[39]
'NA' cannot be read as a number for spd6[39]
'NA' cannot be read as a number for spd12[39]
'NA' cannot be read as a number for spd15[39]
'NA' cannot be read as a number for spm6[39]
'NA' cannot be read as a number for spm12[39]
'NA' cannot be read as a number for spm15[39]
'NA' cannot be read as a number for put15[41]
'NA' cannot be read as a number for spd15[41]
'NA' cannot be read as a number for spm15[41]
'NA' cannot be read as a number for put12[43]
'NA' cannot be read as a number for spd12[43]
'NA' cannot be read as a number for spm12[43]
'NA' cannot be read as a number for put15[51]
'NA' cannot be read as a number for spd15[51]
'NA' cannot be read as a number for spm15[51]
'NA' cannot be read as a number for put12[55]
'NA' cannot be read as a number for put15[55]
'NA' cannot be read as a number for spd12[55]
'NA' cannot be read as a number for spd15[55]
'NA' cannot be read as a number for spm12[55]
'NA' cannot be read as a number for spm15[55]
'NA' cannot be read as a number for put6[56]
'NA' cannot be read as a number for put12[56]
'NA' cannot be read as a number for put15[56]
'NA' cannot be read as a number for spd6[56]
'NA' cannot be read as a number for spd12[56]
'NA' cannot be read as a number for spd15[56]
'NA' cannot be read as a number for spm6[56]
'NA' cannot be read as a number for spm12[56]
'NA' cannot be read as a number for spm15[56]
'NA' cannot be read as a number for put12[69]
'NA' cannot be read as a number for put15[69]
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'NA' cannot be read as a number for spd12[69]
'NA' cannot be read as a number for spd15[69]
'NA' cannot be read as a number for spm12[69]
'NA' cannot be read as a number for spm15[69]
'NA' cannot be read as a number for put12[80]
'NA' cannot be read as a number for put15[80]
'NA' cannot be read as a number for spd12[80]
'NA' cannot be read as a number for spd15[80]
'NA' cannot be read as a number for spm12[80]
'NA' cannot be read as a number for spm15[80]
'NA' cannot be read as a number for put12[81]
'NA' cannot be read as a number for put15[81]
'NA' cannot be read as a number for spd12[81]
'NA' cannot be read as a number for spd15[81]
'NA' cannot be read as a number for spm12[81]
'NA' cannot be read as a number for spm15[81]
'NA' cannot be read as a number for put15[87]
'NA' cannot be read as a number for spd15[87]
'NA' cannot be read as a number for spm15[87]
'NA' cannot be read as a number for put6[89]
'NA' cannot be read as a number for put12[89]
'NA' cannot be read as a number for put15[89]
'NA' cannot be read as a number for spd6[89]
'NA' cannot be read as a number for spd12[89]
'NA' cannot be read as a number for spd15[89]
'NA' cannot be read as a number for spm6[89]
'NA' cannot be read as a number for spm12[89]
'NA' cannot be read as a number for spm15[89]
'NA' cannot be read as a number for put6[94]
'NA' cannot be read as a number for put12[94]
'NA' cannot be read as a number for put15[94]
'NA' cannot be read as a number for spd6[94]
'NA' cannot be read as a number for spd12[94]
'NA' cannot be read as a number for spd15[94]
'NA' cannot be read as a number for spm6[94]
'NA' cannot be read as a number for spm12[94]
'NA' cannot be read as a number for spm15[94]
'NA' cannot be read as a number for put15[96]
'NA' cannot be read as a number for spd15[96]
'NA' cannot be read as a number for spm15[96]
'NA' cannot be read as a number for put12[101]
'NA' cannot be read as a number for spd12[101]
'NA' cannot be read as a number for spm12[101]
'NA' cannot be read as a number for put15[104]
'NA' cannot be read as a number for spd15[104]
'NA' cannot be read as a number for spm15[104]
'NA' cannot be read as a number for put6[106]
'NA' cannot be read as a number for put12[106]
'NA' cannot be read as a number for put15[106]
'NA' cannot be read as a number for spd6[106]
'NA' cannot be read as a number for spd12[106]
'NA' cannot be read as a number for spd15[106]
'NA' cannot be read as a number for spm6[106]
'NA' cannot be read as a number for spm12[106]
'NA' cannot be read as a number for spm15[106]
'NA' cannot be read as a number for age[108]
'NA' cannot be read as a number for put15[109]
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'NA' cannot be read as a number for spd15[109]
'NA' cannot be read as a number for spm15[109]
'NA' cannot be read as a number for put12[111]
'NA' cannot be read as a number for put15[111]
'NA' cannot be read as a number for spd12[111]
'NA' cannot be read as a number for spd15[111]
'NA' cannot be read as a number for spm12[111]
'NA' cannot be read as a number for spm15[111]
'NA' cannot be read as a number for put12[112]
'NA' cannot be read as a number for put15[112]
'NA' cannot be read as a number for spd12[112]
'NA' cannot be read as a number for spd15[112]
'NA' cannot be read as a number for spm12[112]
'NA' cannot be read as a number for spm15[112]
'NA' cannot be read as a number for put12[115]
'NA' cannot be read as a number for put15[115]
'NA' cannot be read as a number for spd12[115]
'NA' cannot be read as a number for spd15[115]
'NA' cannot be read as a number for spm12[115]
'NA' cannot be read as a number for spm15[115]
(115 observations read)

#### Verifying that the first case can be dropped
. list in 1

     +-------------------------------------------------------------------------+
  1. | ptid | female | age | dose | put0 | put6 | put12 | put15 | spd0 | spd6 |
     |    . |      . |   . |    . |    . |    . |     . |     . |    . |    . |
     |-------------------------------------------------------------------------|
     |   spd12   |   spd15   |   spm0   |   spm6    |   spm12    |   spm15    |
     |       .   |       .   |      .   |      .    |       .    |       .    |
     +-------------------------------------------------------------------------+

. drop in 1
(1 observation deleted)

#### Finding out sample sizes randomized and then patterns of missing data
#### for the two dose groups of interest. (Note the sample sizes are relatively
#### small, so just listing all cases was reasonable. Otherwise, I would have
#### just listed cases with missing data and with zero values.)
. table dose

----------------------
     dose |      Freq.
----------+-----------
        0 |         32
     .075 |         29
       .2 |         25
       .4 |         28
----------------------
. list spd0 spd6 spd12 spd15 if dose==0

     +---------------------------------------+
     |    spd0      spd6     spd12     spd15 |
     |---------------------------------------|
  3. |   4.209     6.174      5.91     3.368 |
  6. |   5.009     3.953     2.786   2.13996 |
```

```
 11. |   5.292     6.912         .   3.56439 |
 12. |   5.298     1.965   2.85439     1.885 |
 17. |   3.373         .     4.807     3.297 |
     |---------------------------------------|
 19. |   3.398   2.17435     3.828     2.043 |
 26. | 2.40588     1.798     4.445      2.35 |
 29. | 1.66255     6.115     2.051     1.767 |
 33. | 1.50379     3.072     2.297     1.686 |
 35. | 4.12807     2.977     5.056     4.466 |
     |---------------------------------------|
 40. |  1.9399     1.679     2.227         . |
 44. |   2.878     3.245     4.914     1.397 |
 45. |   1.518      4.55     2.836     1.584 |
 49. |   6.164     6.631   2.96342      2.17 |
 51. |   4.796     4.657   2.60517     4.616 |
     |---------------------------------------|
 52. |   3.783     2.847   2.66121     2.291 |
 62. |   4.637    2.2312     3.324      2.86 |
 63. |    2.31   2.62879     1.013     2.738 |
 65. |   2.855   3.19549     5.383     3.554 |
 70. |   7.054    2.7752     5.799     4.477 |
     |---------------------------------------|
 71. |   3.949   2.52972     2.383     1.249 |
 79. |   2.491   2.52965         .         . |
 85. |   1.981     2.195     2.795      2.76 |
 87. | 2.99089     4.282     2.112     2.445 |
 88. |   2.617         .         .         . |
     |---------------------------------------|
 92. | 2.51466     1.505     2.058     2.696 |
 94. |  3.3561     1.571     4.101      3.63 |
 98. | 2.09947     4.705     2.026     2.208 |
103. |  2.0623     3.403     3.619         . |
104. |   3.035     3.331       2.3     3.054 |
     |---------------------------------------|
111. |   1.684     3.643         .         . |
112. |   1.398     1.809     2.012      2.28 |
     +---------------------------------------+
```

**. bysort msngspd12: tabstat female age put0 spd0 spm0 if dose==0, stat(n mean sd >
> min p25 p50 p75 max) col(stat) format**

```
--------------------------------------------------------------------------------
-> msngspd12 = 0

variable |    N      mean      sd       min     p25       p50       p75       max
---------+--------------------------------------------------------------------------
  female | 28.000    0.214   0.418     0.000   0.000     0.000     0.000     1.000
     age | 28.0      65.1     8.4      45.5    61.0      66.3      71.5      77.2
    put0 | 28.00      0.69    0.47      0.06    0.32      0.60      0.97      1.98
    spd0 | 28.00      3.30    1.46      1.40    2.08      3.01      4.17      7.05
    spm0 | 28.00      8.53    5.77      2.12    6.04      7.52      9.16     35.55
--------------------------------------------------------------------------------

--------------------------------------------------------------------------------
-> msngspd12 = 1

variable |    N      mean     sd       min     p25       p50       p75       max
```

```
---------+-------------------------------------------------------------------------------
  female |  4.000    0.000    0.000     0.000    0.000     0.000     0.000     0.000
     age |  4.0     71.4      7.6      60.1     67.2      74.9      75.6      76.0
    put0 |  4.00     0.51     0.13      0.35     0.41      0.51      0.61      0.66
    spd0 |  4.00     3.02     1.57      1.68     2.09      2.55      3.95      5.29
    spm0 |  4.00     6.02     3.11      1.46     4.09      7.17      7.95      8.28
-------------------------------------------------------------------------------
```

. list spd0 spd6 spd12 spd15 if dose>0.3

```
     +---------------------------------------+
     |     spd0      spd6     spd12     spd15 |
     |---------------------------------------|
  1. | 6.831333     1.723     1.758   2.35871 |
  7. |    3.904     1.462   1.09166   1.28947 |
  9. |    5.294     1.667   2.61729         . |
 10. |    5.114     2.794   1.23775   2.54599 |
 23. |    4.062     2.147         0     3.018 |
     |---------------------------------------|
 28. |    3.235     6.344     2.613     2.711 |
 36. |  2.20223     6.077     3.321     4.433 |
 39. |  2.40854     2.994     1.275     3.423 |
 42. |    4.286     2.587         .     4.465 |
 43. |     1.96     4.484     3.417     2.779 |
     |---------------------------------------|
 48. |    7.165     4.665   2.13567     1.893 |
 54. |      7.6   2.81025         .         . |
 55. |    2.895         .         .         . |
 61. |    3.275   1.66387     2.258     3.451 |
 64. |    3.002   1.65614     1.089     2.693 |
     |---------------------------------------|
 72. |    7.212   1.47339     1.731     2.375 |
 74. |    1.514   2.89825     1.676     1.393 |
 75. |    5.243   1.05862     1.956      2.68 |
 78. |    3.441   1.49542     2.685     1.862 |
 80. |    2.913   1.89131         .         . |
     |---------------------------------------|
 86. |      .66     2.069     1.902         . |
 93. |    2.268         .         .         . |
 96. |  3.16644     4.278       2.3     2.906 |
 97. |  2.30801     2.881     2.042     2.393 |
105. |    2.087         .         .         . |
     |---------------------------------------|
108. |    2.104     1.817     1.886         . |
110. |    1.658     2.065         .         . |
114. |     2.01     1.922         .         . |
     +---------------------------------------+
```

. bysort msngspd12: tabstat female age put0 spd0 spm0 if dose> 0.3, stat(n mean sd > min p25 p50 p75 max) col(stat) format

```
-------------------------------------------------------------------------------
-> msngspd12 = 0

variable |    N      mean     sd       min     p25       p50       p75       max
---------+---------------------------------------------------------------------
```

```
  female | 20.000    0.200   0.410     0.000   0.000     0.000     0.000     1.000
     age | 20.0      64.5     7.9      48.9    61.4      65.7      69.4      81.0
    put0 | 20.00      0.57    0.31      0.00    0.41      0.60      0.73      1.31
    spd0 | 20.00      3.71    1.89      0.66    2.26      3.25      5.18      7.21
    spm0 | 20.00      8.50    6.33      2.28    5.74      7.22      9.17     34.04
-------------------------------------------------------------------------------

-------------------------------------------------------------------------------
-> msngspd12 = 1

variable |     N      mean     sd       min     p25       p50       p75       max
---------+---------------------------------------------------------------------
  female |  8.000     0.250  0.463     0.000   0.000     0.000     0.500     1.000
     age |  8.0      62.2     7.8      48.5    58.1      61.2      68.7      73.1
    put0 |  8.00      0.87    0.96      0.00    0.02      0.67      1.63      2.30
    spd0 |  8.00      3.21    1.95      1.66    2.05      2.58      3.60      7.60
    spm0 |  8.00      7.05    2.45      4.63    5.27      6.65      7.79     12.35
-------------------------------------------------------------------------------

#### Generating a new variable measuring the difference between spermidine measurements at
#### 12 months and randomization
. gen diffspd = spd12 - spd0
(19 missing values generated)

#### Generating a new variable indicating cases with a 12 month spermidine measurement
#### lower than the measurement at randomization
. gen decrspd= diffspd
(19 missing values generated)

. recode decrspd min/0=1 0/max=0
(decrspd: 95 changes made)

#### Generating a new variable measuring the ratio between spermidine measurements at
#### 12 months and randomization
. gen ratspd = spd12 / spd0
(19 missing values generated)

#### Generating new variable measuring the log spermidine measurements at
#### 12 months and randomization. Note that I had to check for measurements that
#### were 0. I found one for the spd12 variable, so I decided to find the lowest
#### nonzero spermidine measurement obtained (across all times and dose groups)
#### and use half that value for the zero spermidine measurement.
. list if spd0==0

. list if spd12==0

     +-------------------------------------------------------------------------+
 23. | ptid | female |      age | dose |  put0 | put6 | put12 | put15 |  spd0 |
     | 8034 |      0 | 69.25941 |   .4 | 1.004 | .658 |     0 | 1.793 | 4.062 |
     |---------------+---------------------------------------------------------|
     |  spd6 | spd12 | spd15  |   spm0  |  spm6  | spm12  | spm15  | diffspd  |
     | 2.147 |     0 | 3.018  | 10.207  | 5.429  |     0  | 4.034  |  -4.062  |
     |-------------------------------------------------------------------------|
     |              decrspd              |              ratspd                 |
     |                   1               |                   0                 |
     +-------------------------------------------------------------------------+

. summ spd0 if spd0>0
```

```
    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
        spd0 |       114    3.409728     1.55291        .66        7.6

. summ spd6 if spd6>0

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
        spd6 |       106    2.842533    1.412813    1.05862      7.844

. summ spd12 if spd12>0

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
       spd12 |        94    2.798014     1.20635       .293      6.454

. summ spd15 if spd15>0

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
       spd15 |        91    2.863014    .8800331      1.249      4.832

. gen logspd0 = log(spd0)

. gen logspd12 = log(spd12)
(20 missing values generated)

. replace logspd12 = log(.293/2) if spd12==0
(1 real change made)



#### Testing for a mean difference of 0 in the dose 0 group. I do this two ways:
#### Once using the variable that measured the difference, and once using the
#### Stata facility for the paired t test. Identical results are obtained for
#### inference about the difference. (On all other analyses, I will only do
#### the paired t test, because that gives more descriptive statistics.
. ttest diffspd=0 if dose==0

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
 diffspd |      28   -.0408007    .2896714    1.532797   -.6351573    .5535559
------------------------------------------------------------------------------
    mean = mean(diffspd)                                          t =  -0.1409
Ho: mean = 0                                     degrees of freedom =       27

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.4445         Pr(|T| > |t|) = 0.8890          Pr(T > t) = 0.5555

. ttest spd12=spd0 if dose==0

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
```

```
---------+--------------------------------------------------------------------
   spd12 |      28    3.255935    .2482656    1.313698    2.746536    3.765334
    spd0 |      28    3.296736    .2760724    1.460838    2.730282     3.86319
---------+--------------------------------------------------------------------
    diff |      28   -.0408007    .2896714    1.532797   -.6351573    .5535559
------------------------------------------------------------------------------
     mean(diff) = mean(spd12 - spd0)                               t =  -0.1409
 Ho: mean(diff) = 0                           degrees of freedom =       27

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.4445         Pr(|T| > |t|) = 0.8890          Pr(T > t) = 0.5555

#### Testing for a mean ratio of 1 in the dose 0 group.
. ttest ratspd=1 if dose==0

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  ratspd |      28    1.102714    .0886918    .4693129    .9207334    1.284694
------------------------------------------------------------------------------
    mean = mean(ratspd)                                           t =   1.1581
Ho: mean = 1                                 degrees of freedom =       27

    Ha: mean < 1                 Ha: mean != 1                 Ha: mean > 1
 Pr(T < t) = 0.8715         Pr(|T| > |t|) = 0.2570          Pr(T > t) = 0.1285

#### Testing for a mean difference of 0 in the dose 0.4 group. Note that Stata represents
#### typed data and infile data in different levels of precision (apparently). That is
#### why we ran into problems with "dose==0.4" (a number that can not be represented
#### exactly in base 2).
. ttest spd12=spd0 if dose>0.3

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
   spd12 |      20    1.949568     .178642    .7989114    1.575666    2.323471
    spd0 |      20    3.705078    .4227681    1.890676    2.820214    4.589941
---------+--------------------------------------------------------------------
    diff |      20   -1.755509    .4855573    2.171478   -2.771792   -.7392261
------------------------------------------------------------------------------
     mean(diff) = mean(spd12 - spd0)                               t =  -3.6155
 Ho: mean(diff) = 0                           degrees of freedom =       19

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0009         Pr(|T| > |t|) = 0.0018          Pr(T > t) = 0.9991

#### Testing for a mean ratio of 1 in the dose 0.4 group.
. ttest ratspd=1 if dose > 0.3

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  ratspd |      20    .7550932    .1489955    .6663283    .4432419    1.066944
------------------------------------------------------------------------------
```

```
    mean = mean(ratspd)                                           t =  -1.6437
Ho: mean = 1                                     degrees of freedom =       19

    Ha: mean < 1                 Ha: mean != 1                 Ha: mean > 1
 Pr(T < t) = 0.0583         Pr(|T| > |t|) = 0.1167          Pr(T > t) = 0.9417


#### CI and Testing for 50% of subjects having decreased spd in the dose 0 group.
. ci decrspd if dose==0, binomial

                                                              -- Binomial Exact --
    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
     decrspd |         28    .4642857    .0942498        .2751086    .6613009

. bitest decrspd=0.5 if dose==0

    Variable |        N   Observed k   Expected k   Assumed p   Observed p
-------------+-----------------------------------------------------------
     decrspd |       28         13           14     0.50000     0.46429

  Pr(k >= 13)            = 0.714206  (one-sided test)
  Pr(k <= 13)            = 0.425277  (one-sided test)
  Pr(k <= 13 or k >= 15) = 0.850554  (two-sided test)

#### CI and Testing for 50% of subjects having decreased spd in the dose 0.4 group.
. ci decrspd if dose>0.3, binomial

                                                              -- Binomial Exact --
    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
     decrspd |         20          .8    .0894427         .563386     .942666

. bitest decrspd=0.5 if dose>0.3

    Variable |        N   Observed k   Expected k   Assumed p   Observed p
-------------+-----------------------------------------------------------
     decrspd |       20         16           10     0.50000     0.80000

  Pr(k >= 16)            = 0.005909  (one-sided test)
  Pr(k <= 16)            = 0.998712  (one-sided test)
  Pr(k <= 4 or k >= 16)  = 0.011818  (two-sided test)

#### Testing that the log ratio of geometric means is 0 in the dose 0 group.
#### Note that I then back transform to the geometric mean ratios by exponentiating
#### the point and interval estimates.
. ttest logspd12=logspd0 if dose==0

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
logspd12 |      28    1.101382     .077731    .4113139    .9418907    1.260872
 logspd0 |      28    1.099689    .0836369    .4425647    .9280804    1.271298
---------+--------------------------------------------------------------------
    diff |      28    .0016925    .0867118    .4588356   -.1762253    .1796104
------------------------------------------------------------------------------
```

```
     mean(diff) = mean(logspd12 - logspd0)                        t =   0.0195
 Ho: mean(diff) = 0                                degrees of freedom =       27

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.5077         Pr(|T| > |t|) = 0.9846          Pr(T > t) = 0.4923

. disp exp(1.101382)
3.0083207

. disp exp(1.099689)
3.0032319

. disp exp(0.0016925)
1.0016939

. disp exp(-0.1762253)
.83842906

. disp exp(0.1796104)
1.196751

#### Testing that the log ratio of geometric means is 0 in the dose 0.4 group.
. ttest logspd12=logspd0 if dose>0.3

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
logspd12 |      20    .5372735    .1487163    .6650795    .2260067    .8485402
 logspd0 |      20    1.167725     .130826    .5850716     .893903    1.441547
---------+--------------------------------------------------------------------
    diff |      20   -.6304515    .2112218    .9446128   -1.072544    -.188359
------------------------------------------------------------------------------
     mean(diff) = mean(logspd12 - logspd0)                        t =  -2.9848
 Ho: mean(diff) = 0                                degrees of freedom =       19

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0038         Pr(|T| > |t|) = 0.0076          Pr(T > t) = 0.9962

. disp exp(.5372735)
1.7113345

. disp exp(1.167725)
3.2146709

. disp exp(-0.6304515)
.53235139

. disp exp(-1.072544)
.34213701

. disp exp(-.188359)
.82831729

. log close
      log:  C:\My Documents\teach\b517\f05\hw5Stata.log
  log type:  text
```

```
 closed on:   4 Nov 2005, 17:56:03
-------------------------------------------------------------------------------
```