Economics 312 **Spring 2012**
Daily Problem #7 **February 6**

In Friday's daily problem, we considered the following linear wage regression:

```
. reg wage educ

      Source |       SS       df       MS              Number of obs =    1000
-------------+------------------------------           F(  1,   998) =  211.66
       Model |  28794.2878     1  28794.2878           Prob > F      =  0.0000
    Residual |   135771.14   998  136.043226           R-squared     =  0.1750
-------------+------------------------------           Adj R-squared =  0.1741
       Total |  164565.428   999  164.730158           Root MSE      =  11.664

------------------------------------------------------------------------------
        wage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        educ |   1.980288   .1361174    14.55   0.000     1.713178    2.247397
       _cons |  -6.710328   1.914156    -3.51   0.000    -10.46656   -2.954096
------------------------------------------------------------------------------
```

The estimated covariance matrix of the regression coefficients, saved by Stata as e(V) and shown by the Stata command matrix list e(V), is

```
             educ       _cons
 educ   .01852794
_cons  -.25566703   3.6639926
```

1. Verify that the standard errors of the two coefficients as reported in the regression table are the square roots of the diagonal elements of the estimated covariance matrix of the coefficients.
2. According to HGL's equation (2.22), the covariance between the intercept and the slope coefficients is negative if $\bar{x} > 0$. Explain the intuition of this: if we underestimate the slope, why would we tend to overestimate the intercept (and vice versa) and why this depends on the mean of x being positive.
3. Follow the logic of HGL's section 3.6 to examine the one-tailed alternative hypothesis that the predicted wage of a college graduate (educ = 16) from this population is greater than 20.