Economics 113 Professor Spearot
Introduction to Econometrics
Fall 2011 – Midterm 3
Name _____ ID_____

Midterm 3 –90 Points

You must answer all questions. Please write your name on every page. The exam is closed book and closed notes. You may use calculators, but they must not be graphing calculators. No cell phones. Do not use your own scratch paper.

You must show your work to receive full credit

I have neither given nor received unauthorized aid on this examination, nor have I concealed any similar misconduct by others.

*Signature*_____

Suppose that you wish to predict housing prices as a function of lot size and floor space via the following specification:

$$\log(price) = \beta_0 + \beta_1 \log(lotsize) + \beta_2 log(sqrft) + u$$

Here, *price* is measured in dollars, *lotsize* is measured in square feet, and sqrft (floorspace) is also measured in square feet. The results from estimating this equation are below:

```
Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)   5.26768    0.60188 XXXXXXXXXXXXXXXXXXX
log(lotsize)  0.16846    0.03846 XXXXXXXXXXXXXXXXXXX
log(sqrft)    0.76237    0.08089 XXXXXXXXXXXXXXXXXXX
---
Multiple R-squared: 0.6353, Adjusted R-squared: 0.6267
F-statistic: 74.04 on 2 and 185 DF, SSR: 2.924
```

a.) Using the 96% confidence level, test whether the coefficient on *log(lotsize)* is significantly different from zero. Please state your null and alternative hypotheses, and briefly interpret the result. **(10 Points)**

b.) Please construct and interpret a 98% confidence interval for the coefficient on *log(sqrft)*. Show your work! **(10 Points)**

c.) Suppose I claim that the effects of *log(lotsize)* and *log(sqrft)* are identical. Please state a null and alternative hypothesis, and derive an equation that allows me to test the null against the alternative. Show your work!! **(10 Points)**

d.) Suppose that we add the number of bedrooms, *bdrms*, and a variable, *colonial,* that takes on a value of 1 when the house is a colonial and 0 otherwise.

$$\log(price) = \beta_0 + \beta_1 \log(lotsize) + \beta_2 log(sqrft) + \beta_3 bdrms + \beta_4 colonial + u$$

The results are below:

```
Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)   5.55817    0.65104 XXXXXXXXXXXXXXXXXXX
log(lotsize)  0.16782    0.03818 XXXXXXXXXXXXXXXXXXX
log(sqrft)    0.70719    0.09280 XXXXXXXXXXXXXXXXXXX
bdrms         0.02683    0.02872 XXXXXXXXXXXXXXXXXXX
colonial      0.05380    0.04477 XXXXXXXXXXXXXXXXXXX
---
Multiple R-squared: 0.6491,Adjusted R-squared: 0.6322
F-statistic: 38.38 on 4 and 183 DF, SSR=2.814
```

Suppose I claim that *bdrms* has a significant effect on *log(price)*. What is the probability that I'm wrong? Please state the null and alternative hypotheses, and show your work! **(10 Points)**

e.) Is the model in 'd' preferred to the model in 'a'? If a hypothesis test is warranted, test this hypothesis at the 95% level, stating your null and alternative hypotheses. If not, provide other evidence for your answer. **(10 Points)**

f.) Dr. Spearot is in the market for a house, and would like one that is 1000 square feet in floorspace, 5000 square feet in lot size, 3 bedrooms, and a colonial (*colonial=1)*. Please derive an equation that would allow me to estimate a predicted value for such a house with a standard error. Show your work!! **(10 Points)**.

g.) Do the variables in 'd' tell use anything about the log price? If a hypothesis test is warranted, test this hypothesis at the 95% level, stating your null and alternative hypotheses. If not, provide other evidence for your answer. **(10 Points)**

h.) Suppose that we use a different specification, regressing the log housing price on the log of the assessed housing value, *assess*.

$$\log(price) = \beta_0 + \beta_1 \log(assess) + u$$

The results are below:

```
Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.25409    0.76353 XXXXXXXXXXXXXXXXXXXX
log(assess)  1.01341    0.06046 XXXXXXXXXXXXXXXXXXXX
---
Multiple R-squared: 0.7656, Adjusted R-squared: 0.7629
F-statistic: 280.9 on 1 and 186 DF, SSR:  1.88
```

Is the model in 'h' preferred to the model in 'd'? If a hypothesis test is warranted, test this hypothesis at the 95% level, stating your null and alternative hypotheses. If not, provide other evidence for your answer. **(10 Points)**

i.) Occupy Santa Cruz is angry about many things, but they are especially angry about the housing market. Whether they know it or not, they claim that housing assessments are unfair, in that the ratio $\frac{price}{assess}$ depends on the value of *assess*. Using the results from 'g', please test this hypothesis as the 95% level, stating your null and alternative hypotheses, and briefly interpret the result. **(10 Points)**

Normal Distribution from -oo to Z

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990