The University of Kansas

Department of Economics

Quiz 7 **May/01/2019**
Econ 526 - Introduction to Econometrics **Instructor: Caio Vigo Pereira**

Name:

[**Same dataset from Quiz 4 & 5**] Consider a random sample with the Grade Point Average (GPA) and standardized test scores (ACT), along with the performance in an introductory economics course, for students at a large public university. The variable to be explained is *score*, which is the final score in the course measured as a percentage. The econometric model is:

$$log(score) = \beta_0 + \beta_1 hsgpa + \beta_2 log(actmth) + \beta_3 colgpa + u$$

where *hsgpa* is the high school GPA, *log(actmth)* is the natural logarithm of the ACT in math and *colgpa* is the college GPA of the student prior to take the economics course.
The *R* output is:

Regression (A)

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                        Dependent variable:
                    ---------------------------
                             log(score)
-----------------------------------------------
hsgpa                         0.0274
                             (0.0204)

log(actmth)                   0.3082
                             (0.0388)

colgpa                        0.1784
                             (0.0125)

Constant                      2.7073
                             (0.1119)

-----------------------------------------------
Observations                   814
R2                            0.3704
Adjusted R2                   0.3681
Residual Std. Error     0.1662 (df = 810)
F Statistic          158.8443    (df = 3; 810)
===============================================
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Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.70730    0.11192    ?     < 2e-16
hsgpa        0.02741    0.02037    ?        ?
log(actmth)  0.30816    0.03881    ?     6.7e-15
colgpa       0.17840    0.01250    ?     < 2e-16
---
```

SECTION A - MULTIPLE CHOICE

12%

1. Consider the **Regression (A)**. Suppose you want to test whether $\beta_1 > 0$ (one-sided). What is $t_{\hat{\beta}_1}$ equal to?
   A. 0.7445
   B. 24.1939
   C. 1.3431
   D. 0.0413

12% 2. Consider the **Regression (A)** again. Suppose you want to test whether $\beta_1 = 0$ (two-sided). Evaluate the statements below and determine which one is correct.
A. We can reject H_0 at 5% significance level, but not at 1% significance level.
B. We can reject H_0 at 10% significance level, but not at 5% significance level.
C. We can reject H_0 at 1% significance level, but not at 0.1% significance level.
D. We cannot reject H_0 at any significance level less than or equal to 10%.

12% 3. Consider the **Regression (A)** again. Suppose you want to test whether β_3 is statistically significant. Evaluate the statements below and determine which one is correct.
A. $\hat{\beta}_3$ is statistically significant at 1% significance level.
B. $\hat{\beta}_3$ is NOT statistically significant at 1% significance level.
C. $\hat{\beta}_3$ is NOT statistically significant at 5% significance level.
D. $\hat{\beta}_3$ is NOT statistically significant at 10% significance level.

12% 4. Consider the **Regression (A)** again. Suppose you want to test whether β_2 is statistically significant. Evaluate the statements below and determine which one is correct.
A. $\hat{\beta}_2$ is statistically significant at 0.1% significance level.
B. $\hat{\beta}_2$ is statistically significant at 1% significance level.
C. $\hat{\beta}_2$ is statistically significant at 5% significance level.
D. All the above.

12% 5. Consider the **Regression (A)** again. Suppose you want to test whether the elasticity of *score* with respect *actmth* is unitary, i.e., equal to 1 or not. Evaluate the statements below and determine which one is correct.
A. We can NOT reject the null hypothesis at 2% significance level.
B. the t statistic provides **no (or little)** evidence against the null hypothesis at small significance levels ($< 1\%$).
C. the t statistic provides evidence against the null hypothesis at small significance levels ($< 1\%$).
D. $\hat{\beta}_2$ is NOT statistically different from 1 at 5% significance level.

12% 6. Assume that the **Classical Linear Model (CLM)** assumptions hold. As can be seen in the regression output, $\hat{\beta}_3 = 0.178$ and $se(\hat{\beta}_3) = 0.0125$. What is the distribution of $\frac{0.178 - \beta_3}{0.0125}$?
A. t_{df}, where $df = 3$
B. $F_{(3,810)}$
C. $N(0, 0.0125^2)$
D. t_{df}, where $df = 810$

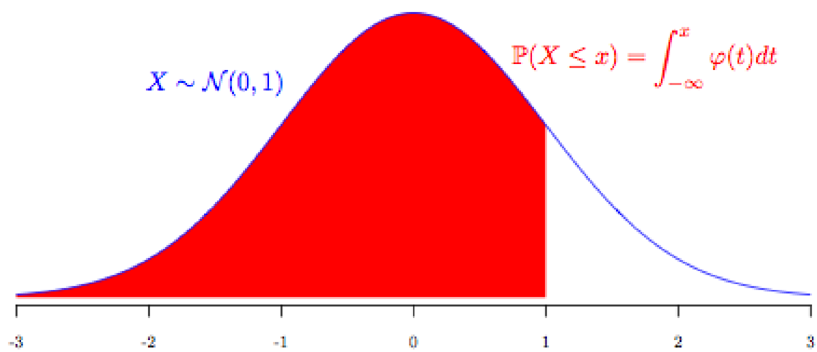
SECTION B - TRUE OR FALSE

10% 1. The 95% confidence interval for β_1 is approximately $[-0.013, 0.067]$.
◯ True ◯ False

9% 2. Consider any multiple linear regression. Knowing that you can reject H_0 for a specific parameter at 1% significance level, then you should be able to reject the H_0 at 2% significance level.
◯ True ◯ False

9% 3. Consider any multiple linear regression. Knowing that you can reject H_0 for a specific parameter at 1% significance level, then you should be able to reject the H_0 at 0.1% significance level.
◯ True ◯ False

Standard Normal Distribution



	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

t-distribution

TABLE G.2 Critical Values of the *t* Distribution

		Significance Level				
1-Tailed:		.10	.05	.025	.01	.005
2-Tailed:		.20	.10	.05	.02	.01
Degrees of Freedom	1	3.078	6.314	12.706	31.821	63.657
	2	1.886	2.920	4.303	6.965	9.925
	3	1.638	2.353	3.182	4.541	5.841
	4	1.533	2.132	2.776	3.747	4.604
	5	1.476	2.015	2.571	3.365	4.032
	6	1.440	1.943	2.447	3.143	3.707
	7	1.415	1.895	2.365	2.998	3.499
	8	1.397	1.860	2.306	2.896	3.355
	9	1.383	1.833	2.262	2.821	3.250
	10	1.372	1.812	2.228	2.764	3.169
	11	1.363	1.796	2.201	2.718	3.106
	12	1.356	1.782	2.179	2.681	3.055
	13	1.350	1.771	2.160	2.650	3.012
	14	1.345	1.761	2.145	2.624	2.977
	15	1.341	1.753	2.131	2.602	2.947
	16	1.337	1.746	2.120	2.583	2.921
	17	1.333	1.740	2.110	2.567	2.898
	18	1.330	1.734	2.101	2.552	2.878
	19	1.328	1.729	2.093	2.539	2.861
	20	1.325	1.725	2.086	2.528	2.845
	21	1.323	1.721	2.080	2.518	2.831
	22	1.321	1.717	2.074	2.508	2.819
	23	1.319	1.714	2.069	2.500	2.807
	24	1.318	1.711	2.064	2.492	2.797
	25	1.316	1.708	2.060	2.485	2.787
	26	1.315	1.706	2.056	2.479	2.779
	27	1.314	1.703	2.052	2.473	2.771
	28	1.313	1.701	2.048	2.467	2.763
	29	1.311	1.699	2.045	2.462	2.756
	30	1.310	1.697	2.042	2.457	2.750
	40	1.303	1.684	2.021	2.423	2.704
	60	1.296	1.671	2.000	2.390	2.660
	90	1.291	1.662	1.987	2.368	2.632
	120	1.289	1.658	1.980	2.358	2.617
	∞	1.282	1.645	1.960	2.326	2.576

Source: Wooldridge, Jeffrey M. *Introductory Econometrics*, 2015.