Cameron   **ECON 132 (Health Economics): FINAL EXAM (A)   Fall 2018**

Bring Scantron for final exam.

<u>Version A</u>

Answer all questions in the space provided on the exam.
Total of 60 points (and worth 44.5% of final grade).
Read each question carefully, so that you answer the question.

Short Answer (6 points each question)

1. Circle True of False to each of the following statements [One point each.]

(a) True   False   Under Obamacare, a 26 year old, single person in Yolo County zip code 95616 with annual income of $32,000 is eligible for insurance subsidy.

(b) True   False   U.S. health expenditures in 2017 are roughly $5,000 per capita.

(c) True   False   A limitation of the Rand health insurance experiment is that once people were in the experiment they were able to choose their coinsurance level.

(d) True   False   For the colon cancer Guaiac tests example (Neuhauser and Lewicki) it would actually be better to not screen at all than to perform all six tests.

(e) True   False   Willingness to pay is an indirect method for determining the value of a life.

(f) True   False   Life expectancy in 2015 is a forecast of average life expectancy for someone born in 2015 using 2015 death rates at each age.

2.(a)(i) Juan believes he faces health costs in the current year of either $5,000 with probability 0.8 or $20,000 with probability 0.2. He can purchase complete insurance for $8,000. Is this premium actuarially fair? Explain your answer.

(ii) Suppose an insurance company sells insurance to 100 people who face the same distribution of health costs as does Juan. What interval will the average claim per individual insured person lie in with probability 0.95?

(b) Data from a drug trial found that a drug led to improvement in a fraction 0.44 of those who received a drug with a standard error of 0.08, while the placebo led to an improvement in a fraction 0.30 of those who received the placebo with a standard error of 0.06. Is the difference statistically significant at significance level 5 percent?
Explain your answer. [Note: $T = [m_1 - m_2] / s$ where m_1 and m_2 are sample means and s equals the square root of $(s_1^2 + s_2^2)$. The critical value for a two-sided test is 1.96.]

(c) Consider the following data from the Manning et al. paper. "Health Insurance and …"

TABLE 2—SAMPLE MEANS FOR ANNUAL USE OF MEDICAL SERVICES PER CAPITA

Plan	Face-to-Face Visits	Outpatient Expenses (1984 $)	Admis-sions	Inpatient Dollars (1984 $)	Prob. Any Medical (%)	Prob. Any Inpatient (%)	Total Expenses (1984 $)
Free	4.55	340	.128	409	86.8	10.3	749
	(.168)	(10.9)	(.0070)	(32.0)	(.817)	(.45)	(39)
25 Percent	3.33	260	.105	373	78.8	8.4	634
	(.190)	(14.70)	(.0090)	(43.1)	(1.38)	(0.61)	(53)
50 Percent	3.03	224	.092	450	77.2	7.2	674
	(.221)	(16.8)	(.0116)	(139)	(2.26)	(0.77)	(144)
95 Percent	2.73	203	.099	315	67.7	7.9	518
	(.177)	(12.0)	(.0078)	(36.7)	(1.76)	(0.55)	(44.8)

(i) What do we essentially learn from this table?

(ii) Calculate the arc price elasticity of demand for outpatient expenses based on movement from the 50 percent plan to the free plan.
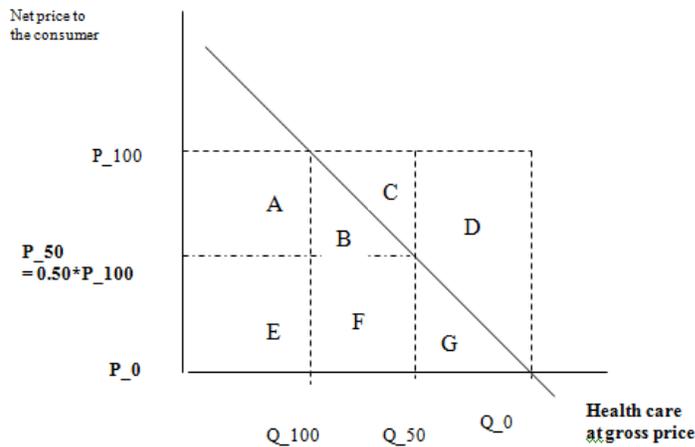
3.(a) For the diagram below: Compare no health insurance to a health insurance policy with 50% coinsurance.

(i) The change in total medical expenditures due to insurance is given by which combinations of areas A, B, C, D E, F and G?

Answer:

(ii) The welfare loss due to moral hazard is given by which combinations of areas A, B, C, D, E, F and G?

Answer:

(b) Consider the market for used cars as presented in class and in the course notes.

Let X = value of the car.

Sellers know the value of the car they sell and their utility is U(X) = X.

Buyers only know that car value is uniformly distributed on (50,150) and their utility is 1.2×X.

Suppose the posted price for used cars is 90. Will consumers buy a car at this price? **Explain your answer.**

(c) Consider the CEA article "Socialized medicine: The case for Medicare for All".

(i) Did the article define the proposal of Medicare for All to include both universal health insurance and free health care? A simple **YES** or **NO** will do.

(ii) Why did the article argue that the direct cost to the government of paying for health care understates the cost to society of the proposal of Medicare for All?

4.(a) Suppose that a person with terminal cancer has the following options:

- Do nothing: spend nothing and live two more years with each year worth 0.4 of a year in perfect health.

- Passive treatment: spend $40,000, live four more years with each year worth 0.5 of a year in perfect health.

- Aggressive treatment: spend $200,000, live ten more years with each year worth 0.6 of a year in perfect health.

With adjustment for quality of life, which treatment – passive or aggressive – is most preferred to no treatment on cost-effectiveness grounds? Explain your answer. For simplicity there is no need to discount.

(b) Consider the following screening test for cancer applied to 100,000 people, 100 of whom have cancer. Each test costs $20, picks up 80% of cancer cases, and additionally 10% of the time falsely diagnoses cancer. Detection of cancer (rightly or wrongly) leads to a further exact diagnostic test that costs $200. Correct early detection of cancer by the test is valued at $20,000. Is the first test worthwhile? **Explain your answer.**

(c) The World Health Organization (WHO) is considering sending a team of experts in to deal with an outbreak of schistosomiasis in a distant country. Sending a larger team will allow them to prevent more fatalities, and they estimate the following effectiveness:

Team Size	0	5	10	15	20	25
Deaths	120	50	20	10	6	4

It costs $5,000 for each team member sent, and a life saved is valued at $5,000.

What is the optimal number of members in the team? **Explain your answer.**

5.(a) On an appropriate diagram show the impact on individual consumer well-being of a good health shock that leads to increased ability to produce health capital.

(b) Suppose, for simplicity, that a doctor trains for 1 year, is a resident for 1 year and works one year. You are given the following data for a doctor and for a typical college graduate (who begins work immediately after college) over three years. The discount rate is 20% and you are to do calculations in year 1 dollars.

Year	1	2	3
Doctor	-60	90	144
College Graduate	30	48	72

Given these data what is financially better? Being a doctor or being a typical college graduate? **Explain your answer.**

(c) Insecticide-treated nets for sleeping under can reduce the chance of getting malaria. As an experiment some farmers in a poor African country were given free mosquito nets. Their average farm income changed from $600 (before having the nets) to $800 (after receiving the nets). A control group of farmers had their average income change over the same period from $650 to $750. Provide an estimate of the causal effect on farm income of having insecticide-treated nets. **Show your workings.**

6.(a)(i) Consider testing of chemicals for potential carcinogens. To properly test each chemical costs $20 million. If Q chemicals are tested a typical household places value $(1 - 0.02×Q) on each chemical tested. There are 100 million households in the U.S. What is the socially optimal number of chemical tests that should be sponsored by the National Institutes for Health.

(ii) Provide two major examples of public goods in the health sector.

(b) Consider vaccination against a contagious disease. If a person is vaccinated there is a direct benefit to the person (they are less likely to get the disease), as well as an indirect benefit to others (someone vaccinated is less likely to pass the disease the disease on to others. Vaccination costs $20. Show on an appropriate diagram that a competitive market will lead to too few people having vaccinations. On the same diagram show the welfare loss to society.

(c)(i) State the main negative aspect for health care of government laws providing patent protection.

(ii) State the main positive aspect for health care of government laws providing patent protection.

7. The output for question 7 is given on the last page of the exam, which you might find helpful to tear out.

Key variables: lyg = Life-years gained
              price = Drug price at launch per treatment-episode 2012 $1000's
              plyg = Price per life-year gained 2012 $1000's
              time = Approval date since 1995 in years
              year = Approval date (year)
              placebo =1 if drug trial had placebo comparative
              lncomp = number of drugs previously approved for the tumor site

For each of the following (aside from part (vi)) if there is not enough information to answer the question then state this.

(i) By how much does drug price at launch increase with one more life year gained?

(ii) After controlling for life year gained is there an additional statistically significant effect at level 0.05 on drug price if the drug trial had a placebo? **Explain.**

(iii) Is the elasticity of drug price at launch with respect to life years gained statistically significantly different from one at level 0.05? **Explain.**

(iv) What is the annual percentage change in drug price at launch per life year gained? **Explain.**

(v) What economics lesson do we learn from the last set of regression output? **Explain.**

(vi) What **regression command** would give similar results to the Stata command
ttest price, by(placebo) ?

Multiple Choice (1 points each) **Note: You should spend 30% of time on these!**

1. Government in 2017 pays for roughly

a. one-quarter of U.S. health expenditures
b. one-half of U.S.health expenditures
c. three-quarters of U.S. health expenditures
d. all of U.S. health expenditures

2. The marginal efficiency of capital curve is used to demonstrate

a. individual choice of the level of health capital
b. individual choice of whether to invest in training as a doctor
c. health care is a superior good
d. none of the above.

3. Doctor's pay in the U.S. is high due to

a. high return on training
b. high training costs
c. neither a. nor b.
d. both a. and b.

4. If utility is 80 when X=10, 140 when X=20, 180 when X=30 and 200 when X=40 then expected utility when X=10 with probability 0.25 and X=40 with probability 0.75 is

a. 80
b. 140
c. 180
d. none of the above

5. The article by Neuhauser and Lewicki, "What Do We Gain from the Sixth Stool Guaiac?"? found that

a. the marginal benefit of the second test was negative
b. the marginal benefit of the third test was negative
c. the marginal benefit of the fourth test was negative
d. none of the above.

6. For a pharmaceutical company selling a patented drug in different countries we expect

a. a higher price in countries with more price elastic demand
b. a higher price in countries with less price elastic demand
c. similar price across countries (assuming similar MC across countries)
d. any of the above is likely.

7. Hospitals in the U.S. generally do not exercise market power because
a. there are so many hospitals in the U.S.
b. they are generally not for profit hospitals
c. neither a nor b
d. both a and b

8. Phase III drug trials to show a drug is safe and effective are required for
a. the original developer of the drug
b. manufacturers of a generic version of the drug after it comes off patent
c. both a. and b.
d. neither a. nor b.

9. The economic rationale for patent protection for prescription drugs is
a. internalization of a positive externality
b. privatization of a public good to make it excludable
c. redistribution of income to wealthy corporations
d. creation of a monopoly that will maximize consumer surplus

10. Medicare Part B (physician and outpatient) is provided
a. free to those eligible
b. at heavily subsidized insurance rates to those eligible
c. at actuarially fair insurance rates to those eligible

11. In deciding on the optimal provision of a nonexcludable public good the major challenge for government policy-makers is
a. determining social marginal cost
b. determining social marginal benefit
c. neither of these is relevant

12. For Medicare Part D for Yolo County
a. there are many plans to choose from
b. the choice as to which plan is best is straightforward
c. neither a. nor b.
d. both a. and b.

13. A Pigouvian tax is a tax that
a. leads to socially optimal production of a pure public good
b. leads to socially optimal production of a good produced with a negative externality
c. both a. and b.
d. neither a. nor b.

14. The Coase Theorem suggests that
a. assignment of property rights may solve the externality problem
b. assignment of property rights may solve the free-rider problem
c. both a. and b.
d. neither a. nor b.

15. Medicare parts A and B cover
a. hospital, physicians, pharmaceutical drugs, nursing homes
b. hospital, physicians, pharmaceutical drugs
c. hospital, physicians
d. hospital

16. Given the level of per capita health expenditures the U.S., compared to other OECD countries, has
a. higher infant mortality rates than expected
b. longer life expectancy than expected
c. both a. and b.
d. neither a. nor b.

17. The major gains in life expectancy due to increased health spending per capita occur
a. at relatively high levels of spending
b. at moderate levels of spending
c. at relatively low levels of spending
d. uniformly across these levels of spending

18. In less developed countries most health expenses are paid
a. through government health insurance
b. through private health insurance
c. out of pocket
d. through government clinics

7. Data for question 7.

Key variables: lyg = Life-years gained
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```
. regress price lyg, vce(robust)

Linear regression                               Number of obs   =         56
                                                F(1, 54)        =     344.44
                                                Prob > F        =     0.0000
                                                R-squared       =     0.8550
                                                Root MSE        =     41.877
------------------------------------------------------------------------------
             |               Robust
       price |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lyg |   158.2736   8.528037    18.56   0.000     141.1759    175.3713
       _cons |  -7.835199   4.753944    -1.65   0.105    -17.36628    1.695884
------------------------------------------------------------------------------

. regress price lyg placebo, vce(robust)
             |               Robust
       price |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
         lyg |   159.8859   8.966118    17.83   0.000     141.9021    177.8696
     placebo |   17.02594   14.13244     1.20   0.234    -11.32014    45.37202
       _cons |   -13.4617   6.724949    -2.00   0.050    -26.95024    .0268427
------------------------------------------------------------------------------

. regress lnprice lnlyg, vce(robust)
             |               Robust
     lnprice |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
       lnlyg |   1.082236   .1679802     6.44   0.000     .7454561    1.419016
       _cons |   4.660764   .1878765    24.81   0.000     4.284094    5.037434
------------------------------------------------------------------------------

. regress lnplyg year, vce(robust)
             |               Robust
      lnplyg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
        year |   .0947951   .0257312     3.68   0.001     .0432071     .146383
       _cons |  -185.6063   51.69665    -3.59   0.001    -289.2518   -81.96073
------------------------------------------------------------------------------

. regress lnplyg year lncomp, vce(robust)
             |               Robust
      lnplyg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
        year |   .0951643   .0227698     4.18   0.000     .0494939    .1408348
      lncomp |  -.6326371    .173289    -3.65   0.001    -.9802109   -.2850633
       _cons |  -184.9483   45.63261    -4.05   0.000    -276.4757   -93.42087
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