

Answer all questions in the space provided on the exam.

Total of 36 points (and worth 22.5% of final grade).

Read each question carefully, so that you answer the question.

Short Answer (6 points each question)

1.(a) Consider data from the article by William Black et al. (2014), “Cost-effectiveness of CT Screening in the National Lung Screening Trial”, *New England Journal of Medicine*, 371: 1793-1802. The study was a randomized trial on 50,000 people aged 55-75 years who had a smoking history of at least 30 pack-years. Some participants received three low-dose computerized tomography (CT) chest scans per year, while the remainder received no screening.

For those in the no screening group, subsequent lung-cancer treatment costs averaged \$900 per person and the quality-adjusted life expectancy averaged 10.87 years per person.

For those with CT screening, the screening costs (total for the three scans) were \$800 per person, subsequent lung-cancer treatment costs averaged \$1,100 and quality-adjusted life expectancy was 10.97 years per person.

Is the CT screening worthwhile if the threshold is \$25,000 per QALY? **Explain your answer.**

(b) The following table gives costs and benefits of sending teams of different sizes to treat a disease outbreak in a poor country.

Team size	Total cost	Total lives saved
0	0	0
5	250,000	600
10	500,000	1,000
15	750,000	1,200
20	1,000,000	1,300
25	1,250,000	1,350
30	1,500,000	1,370

What is the optimal team size if saving a life is valued at \$5,000? **Explain your answer.**

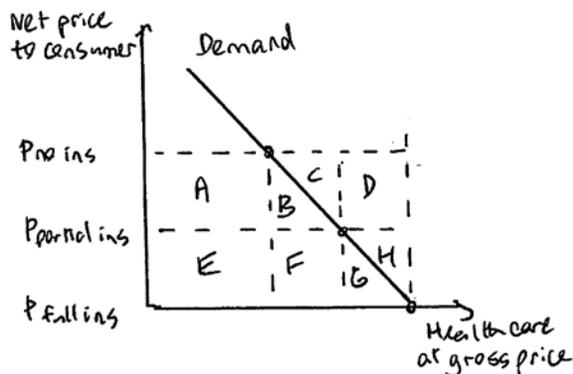
(c) Consider the following screening test for cancer applied to 100,000 people of whom 1,000 have cancer. Each test costs \$50, picks up 80% of cancer cases, and additionally 10% of the time falsely diagnoses cancer. Detection of cancer (rightly or wrongly) leads to a further exact diagnostic test that costs \$100. Correct early detection of cancer by the test is valued at \$5,000. Is this test worthwhile? **Explain your answer.**

2. Circle True or False to each of the following statements about the U.S. health market.

[One point each.]

- (a) **True** **False** Universal health insurance need not be solely government-provided.
- (b) **True** **False** The sixth stool Guiac test article showed that one test was optimal.
- (c) **True** **False** A limitation of cost-benefit analysis is the need to place a dollar on the benefits of treatment.
- (d) **True** **False** Average income of US primary care physicians exceeds \$300,000 per year
- (e) **True** **False** The majority of hospitals in the U.S. are for-profit hospitals..
- (f) **True** **False** The main reason for rising real hospital costs since 1950 is increased labor per patient bed day.

3.(a) Consider the following diagram.



(i) Give the combinations of A, B, ..., H that show change in society's health expenditures in going from partial insurance to complete insurance.

(ii) Give the combinations of A, B, ..., H that show the change in society's well-being in going from partial insurance to complete insurance.

(b) Suppose all individuals face a loss distribution that is uniformly distributed on (\$0, \$9,000). Each individual knows his loss but the insurance company does not. If all individuals are risk neutral will the insurance company make a profit if it sells a complete-cover insurance policy for \$5,000 (and faces administration costs of \$1,000 per policy)? **Explain your answer.**

(c)(i) Provide a definition of the hospital chargemaster.

(ii) Provide a definition of adverse selection.

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4.(a) 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 10% and you are to do calculations in year 1 dollars.

Year	1	2	3
Doctor	-25	55	110
College Graduate	20	44	66

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

(b) On an appropriate diagram show **consumer choice between consumption of non-health goods and the level of health.**

(Now suppose the person becomes seriously ill. **On the same diagram**, show the effect on consumer choice between consumption of non-health goods and level of health.

(c) On an appropriate diagram show the impact of physician-induced demand on price and quantity of health care.

5. We use the Rand Health Insurance Experiment data studied in various homeworks. There are five indicator variables for different levels of health insurance: coins0, coins25, coins50, coins95 and coinsindiv (where the last is the individual deductible plan). We also consider variables age (age in years) and bad_health (= 1 if health is bad and = 0 otherwise). The outcome variable is out_infl (outpatient spending) of lnout (ln(out)).

```
. reg out_infl coins25 coins50 coins95 coinsindiv age bad_health, vce(robust)
```

	Robust				[95% Conf. Interval]	
out_infl	Coef.	Std. Err.	t	P> t		
coins25	-505.0152	191.7015	-2.63	0.009	-881.2554	-128.7749
coins50	-748.8159	195.0987	-3.84	0.000	-1131.724	-365.9082
coins95	-660.1127	208.0777	-3.17	0.002	-1068.494	-251.732
coinsindiv	-688.5892	189.4542	-3.63	0.000	-1060.419	-316.7595
age	34.59961	4.573439	7.57	0.000	25.62362	43.57561
bad_health	500.96	380.1701	1.32	0.188	-245.1755	1247.096
_cons	860.6539	136.3986	6.31	0.000	592.9531	1128.355

(i) Does bad health have a statistically significant relationship with outpatient spending? **Explain your answer.**

(ii) What Stata command would you give to establish whether the level of health insurance has a statistically significant effect on outpatient health spending? Give the complete command.

(iii) For this dataset can the result from part (ii) be given a causal interpretation, or is it merely a correlation? **Explain your answer.**

(iv) The Stata command

```
regress lnout coins25 coins50 coins95 coinsindiv age bad_health
```

led to a coefficient of 0.0840 for variable **bad_health**. Give a simple meaningful interpretation of the impact of bad health on the level of outpatient health expenditures.

(v)-(vi) Two points and separate from the preceding.

Consider a policy change that came into effect in 2010. We have data for 2005 and 2015. The outcome variable in 2015 was 10 in communities affected by the policy and 12 in communities not affected by the policy. The outcome variable in 2005 was 5 in communities affected by the policy and 10 in communities not affected by the policy.

Give the difference in differences estimate of the effect of the policy. **Show computations.**

Multiple Choice (1 point each) Note: You should spend 15-20 % of time on these!

1. Methods to control moral hazard include

- a. gatekeeping
- b. coinsurance
- c. neither a. nor b.
- d. both a. and b.

2. Standard health policy methods for estimating the value of a life are

- a. willingness to pay to avoid risks
- b. willingness to accept risks
- c. neither a. nor b.
- d. both a. and b.

3. In equilibrium the marginal efficiency of health capital

- a. is less than the market investment rate plus the health depreciation rate
- b. equals the market investment rate plus the health depreciation rate
- c. exceeds the market investment rate plus the health depreciation rate
- d. none of the above.

4. The income elasticity of health care is

- a. less than zero
- b. between 0 and 1
- c. between 1 and 2
- d. more than 2.

5. Which reimbursement mechanisms encourage over-servicing by hospitals?

- a. retrospective payment
- b. prospective payment
- c. neither a. nor b.
- d. both a. and b

6. In homework 3 the variable **waz** measured

- a. weight
- b. weight divided by age
- c. weight divided by age and standardized to have mean near 0 and variance near 1.
- d. weight at each age standardized to have mean near 0 and variance near 1.