1. (a) Suppose the health production possibility frontier shifts from PPF\(_1\) to PPF\(_2\). For the following diagram answer the following questions.

(i) At which point is health completely restored: K, F or C?

(ii) Which point will the consumer choose: K, F or C?

![Diagram](image.png)

1. (b) (i) Give an example of an event that would lead to the shift from PPF\(_1\) to PPF\(_2\) given in the above diagram.

(ii) Why is the Grossman model used for health demand rather than the conventional model of consumer choice?

1. (c) On an appropriate diagram show why two individuals who are the same in every way (same preferences, income and prices faced), except that one is substantially more educated and smarter than the other, might have different levels of health.
2. Circle True or False to each of the following statements. [One point each.]

(a) True False Health spending as a fraction of GDP has more than doubled since 1960.
(b) True False Economics is especially useful in resolving normative health issues.
(c) True False The Rand health insurance experiment found that access to better health insurance led to a reduction in mortality rates.
(d) True False A weakness of the Oregon Medicaid Experiment was a lack of randomization.
(e) True False Reimbursement by diagnosis related group discourages over-servicing.
(f) True False Outcomes for a given hospital procedure improve with patient volume.

3. Consider the following table

<table>
<thead>
<tr>
<th>Plan</th>
<th>Likelihood of Any Use (%)</th>
<th>One or More Admissions (%)</th>
<th>Medical Expenses (1984 $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>86.7 (0.67)</td>
<td>10.37 (0.420)</td>
<td>777 (32.8)</td>
</tr>
<tr>
<td>Family Pay</td>
<td>78.8 (0.99)</td>
<td>8.83 (0.379)</td>
<td>630 (29.0)</td>
</tr>
<tr>
<td>25 Percent</td>
<td>74.3 (1.86)</td>
<td>8.31 (0.400)</td>
<td>583 (32.6)</td>
</tr>
<tr>
<td>95 Percent</td>
<td>68.0 (1.48)</td>
<td>7.75 (0.354)</td>
<td>534 (27.4)</td>
</tr>
<tr>
<td>Individual</td>
<td>72.6 (1.14)</td>
<td>9.52 (0.529)</td>
<td>623 (34.6)</td>
</tr>
</tbody>
</table>

(a) What do we learn from this table? Explain.

(b) Calculate the arc price elasticity of demand for medical expenses in moving from the 25% plan to the free plan. Note: the 25% plan was effectively only a 16% coinsurance plan as it had 25% coinsurance only up to a limit and then 0% thereafter. So use a coinsurance rate of 16%.

(c)(i) Suppose the income elasticity of health care demand is 0.2. Give the change in health care demand if income rises from $40,000 to $50,000. Show your workings.

(ii) Give the approximate range for the price elasticity of individual demand for health care obtained by empirical studies for the U.S.
4. (a)(i) On an appropriate diagram show the impact of physician-induced demand on price and quantity of medical services.
(ii) On the same diagram show the gain or loss in total surplus (consumer plus producer surplus).

(c) 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.

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td>-40</td>
<td>60</td>
<td>144</td>
</tr>
<tr>
<td>College Graduate</td>
<td>30</td>
<td>48</td>
<td>72</td>
</tr>
</tbody>
</table>

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

(c) On an appropriate diagram show the impact on the medical market in the United States of the implementation of the 1910 Flexner Report.
5. (a)(i) Give the actuarially fair premium for someone who faces loss of $1000 with probability 0.05 and loss of $10,000 with probability 0.95.

(ii) Which insurance company is exposed to greater risk per insured person? Company A sells insurance to 100 independent people with expected loss of $5,000 and standard deviation of $1,000. Company B sells insurance to 10,000 independent people with expected loss of $5,000 and standard deviation of $5,000. Explain your answer.

(b)(i) On an appropriate diagram show the expected well-being for a risk-averse person facing income of either $20,000 or $100,000 with equal probabilities.

(ii) On the same diagram show the level of certain income that gives the same level of well-being as the expected well-being in part (i).

(c)(i) Give a definition of adverse selection.

(ii) Suppose all individuals face a loss distribution that is uniformly distributed on ($0, $10,000). 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 $6,000 (and faces administration costs of $500 per policy)? Explain your answer.
Multiple Choice (1 point each)    Note: You should spend 15-20 % of time on these!
1. The biggest use of health care funds in the U.S. is
   a. pharmaceuticals and supplies
   b. hospitals
   c. physicians
   d. none of the above.
2. The fraction of U.S. health care expenditures paid for by government is approximately
   a. 25 percent
   b. 50 percent
   c. 75 percent
3. After taking into account the higher training time and costs, the rate of return for training to be a specialist in the U.S.
   a. exceeds the rate of return for training to be a general practitioner
   b. is similar to the rate of return for training to be a general practitioner
   c. is less than the rate of return for training to be a general practitioner
4. The hospital market in the United States is one that is best characterized as having which of the following features:
   a. differentiated product
   b. oligopoly
   c. both a. and b.
   d. neither a. nor b.
5. A risk-averse person’s expected health expenses equals the actuarially fair premium for the policy. Then
   a. they will definitely buy the insurance policy
   b. they will definitely not buy the insurance policy
   c. they are indifferent between buying and not buying the policy
   d. it’s unclear given the information - they may either buy or not buy the policy.
6. Harvard University’s experience in the mid-1990’s is a classic case of
   a. insurance death spiral
   b. medical arms race
   c. both a. and b.
   d. neither a. nor b.