1. This question is based on a 2008 study in the journal Critical Care that considered the cost-effectiveness of intensive care unit (ICU) treatment of patients suffering from cardiac arrest who were admitted to a specific German hospital for the years 1999-2001. The study used hospital data, data from a follow-up survey of survivors five years later, and future projections for remaining years of life and future medical costs. The average age of those admitted was 66 years. 350 patients were admitted. 200 died in hospital and 150 survived and were released from hospital. We assume that all would have died if not admitted to hospital. The total hospital costs for all those admitted summed to 7,000,000 Euros. (One Euro is currently equal to US $1.35). The subsequent medical costs were estimated to be 14,000,000 Euros. It was estimated that a total of 2,400 life years were saved, before an average QALY adjustment factor of 0.75. The government views a quality-adjusted year of life as being worth 30,000 Euros.

(a) Perform a cost-benefit analysis of the program. What do you conclude?

(b) Perform a cost-effectiveness analysis of the program. What do you conclude?

(c) What fundamental thing do we learn from the following table? Explain.

<table>
<thead>
<tr>
<th>Number of Tests</th>
<th>Extra Cases Detected</th>
<th>Marginal Cost</th>
<th>MC per extra case detected (= ICER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>648</td>
<td>$2,464,800</td>
<td>$3,804</td>
</tr>
<tr>
<td>2</td>
<td>64.8</td>
<td>$1,706,500</td>
<td>$26,335</td>
</tr>
<tr>
<td>3</td>
<td>6.48</td>
<td>$1,380,600</td>
<td>$213,056</td>
</tr>
<tr>
<td>4</td>
<td>.648</td>
<td>$1,124,100</td>
<td>$1,734,722</td>
</tr>
<tr>
<td>5</td>
<td>.0648</td>
<td>$919,200</td>
<td>$14,185,185</td>
</tr>
<tr>
<td>6</td>
<td>.00648</td>
<td>$755,400</td>
<td>$116,430,000</td>
</tr>
</tbody>
</table>
2.(a) Consider moving from no health insurance to complete health insurance. On an appropriate diagram show
(i) The effect on total medical expenditures.
(ii) The change in society’s welfare.

(b) State features of a fee-for-service health insurance product that lowers moral hazard yet still has good risk reduction benefits.

(c) Explain what we learn from the following figure.
3. (a)(i) On an appropriate diagram show the determination of the price of a drug by a profit-maximizing firm that has a patent on the drug.

(ii) On the same diagram show the welfare loss due to the patent monopoly.

(b)(i) On an appropriate diagram(s) show why a profit-maximizing pharmaceutical company may sell a patented drug for different prices in different countries, even if the cost of production is the same regardless of the country.

(ii) Given your answer in part (i), how does the country that pays a higher price differ from the country that pays a lower price?

(c) Summarize the three phases of human tests of pharmaceutical drugs.
   (Two points for two or three correct, one point for one correct).
4. Circle True or False to each of the following statements about the U.S. [One point each.]
   (a) True    False The present discounted value of future earnings is used to provide a willingness to accept estimate of the value of a life saved.
   (b) True    False Using a high discount rate, compared to a low discount rate, is likely to make a costly one-time medical intervention appear more cost-effective.
   (c) True    False Studies show considerable variability across regions in the rates of standard procedures and Caesarian births.
   (d) True    False U.S. Federal agencies place the value of a human life as in excess of $5 million.
   (e) True    False The main reason for great increase in medical spending is that prices for medical services (without quality adjustment) have risen much faster than general prices.
   (f) True    False Medicare extensively uses cost-effectiveness analysis in determining what procedures it will cover.

5.(a) The following comes from the article by Cutler and McClellan.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Years</th>
<th>Change in treatment costs</th>
<th>Outcome</th>
<th>Value</th>
<th>Net benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart attack</td>
<td>1984-98</td>
<td>$10,000</td>
<td>One-year increase in life expectancy</td>
<td>$70,000</td>
<td>$60,000</td>
</tr>
</tbody>
</table>

(i) What do we conclude from the above results?

(ii) The study valued a year of life at $100,000, yet the above table has a value of only $70,000. Explain why.

(b)(i) What is a QALY?

(ii) Why are QALY’s useful?

(c)(i) Under what circumstances will a drug costing $50,000 per year be covered by health insurance in the U.S.?

(ii) What is a QALY league table?
Multiple Choice (1 point each)  Note: You should spend 15-20 % of time on these!

1. Given adverse selection economic theory predicts that
   a. it is not possible to have one insurance policy with the same premium and benefits for all
   b. it is possible to have one insurance policy with the same premium and benefits for all
   c. either is possible.

2. In the assignment 3 question on Covered California the Anthem Bronze 60 PPO plan
   a. was very similar in financial terms to the Western Health Advantage Bronze 60 PPO plan
   b. was much better in financial terms than the Western Health Advantage Bronze 60 PPO plan
   c. was much worse in financial terms than the Western Health Advantage Bronze 60 PPO plan

3. For pharmaceutical drugs R&D expenditures account for
   a. over two-thirds of expenses
   b. between one-third and two-thirds of total expenses
   c. less than one-third of expenses

4. Suppose surgery is successful with probability 0.9. Then the patient lives for two more years. If instead the surgery is unsuccessful the patient dies immediately. The discount rate is 25%. The expected value of discounted life years for a patient who has surgery is
   a. less than 1.6 years
   b. between 1.6 and 1.7 years
   c. between 1.7 and 1.8 years
   d. more than 1.8 years.

5. Suppose that companies must pay lumberjacks an additional $2,000 a year to perform work that generally kills 2 in 1,000 workers. Then the value of a life is
   a. $1,000,000
   b. $2,000,000
   c. $3,000,000
   d. $4,000,000
   e. none of the above.

6. The economic argument for greater use of cost-effectiveness studies in the case of health care than for many other types of goods and services is that
   a. Health care involves life and death issues
   b. economists need jobs
   c. most health care is paid for through third party payment.