Please answer any 3 of the 4 questions. Each question is weighted equally. You have 5 hours to complete the exam, with a ½ hour break for lunch.

1. Suppose a physician practice is contemplating the adoption of an electronic medical record (EMR) system. The current cost function for the practice is given by  \( mc = 10 \). If the practice adopts the technology the cost function becomes  \( mc = 5 \). The total market demand for physician practice services is given by  \( p = 100 - \frac{1}{2} q \). Suppose the cost of the EMR is $450.

   a. Would a monopolist adopt the EMR system?
   b. Under a symmetric, quantity setting, duopoly would the practice adopt the EMR system in the following two scenarios?
      a. Assume the other practice has already adopted it.
      b. Assume the other practice has not adopted it.
   c. Provide some intuition for your results.

2. Suppose that individuals derive utility from two goods: “health” (H) and “leisure” (L). These goods are not purchased directly but are produced by the individual using her own time and market inputs. The production functions are very simple:

   Each unit of health requires  \( a_h \) medical care inputs and  \( t_h \) time.
   Each unit of leisure requires  \( a_l \) leisure inputs (like Vikings tickets) and  \( t_l \) time.

   Each unit of time costs  \( w \) dollars which is the individual’s wage rate; each unit of medical care costs  \( m \) dollars; and each Vikings ticket costs  \( v \) dollars. The total amount of time available to the individual is fixed at  \( T \) hours per day and the amount of time she works by choice is  \( W \).

   a. Derive explicit expressions for the “prices” of H and L. Use the symbols  \( \pi_h \) and  \( \pi_L \) to stand for these prices.

   b. Recently the price of medical inputs has been rising. Prove that the individual’s response in terms of  \( W \) is given by the expression:

   \[
   \frac{\partial W}{\partial m} = -a_h t_h \left( \frac{\partial H}{\partial \pi_h} \right) - a_l t_l \left( \frac{\partial L}{\partial \pi_L} \right)
   \]

   What is the sign of this expression?
c. Suppose the individual takes a health promotion class that teaches her how to produce health with less time per unit of health. Given that her utility function is now known to be \( U = HL \), how much more (or less) will she work? Derive an explicit expression and evaluate its sign.

3. Consider two individuals who have concave utility functions. One individual is more risk averse than the other. Let them have utility functions of the following form:

\[
U = \alpha - \beta e^{-\gamma y}
\]

where \( \alpha, \beta, \) and \( \gamma \) are constants and \( \gamma \) is Pratt’s measure of absolute risk aversion.

\[
\gamma = \rho = -\frac{U_{yy}}{U_y}.
\]

Let \( \alpha = 100 \) and \( \beta = 10 \). Let individual 1 have \( \gamma_1 = 0.00021 \) and individual 2 have \( \gamma_2 = 0.00046 \). (Note, the first number is Manning and Marquis’ estimate of \( \rho \), the second is their report of one of Marquis and Holmer’s and Friedman’s estimates.) Let each of the individuals have an endowment income of $10,000 and incur a loss due to illness of $1000. Let the probability of illness for both individuals be equal to 0.1. Let the insurance premium include a loading charge that is proportional to the expected loss, so that the premium charged equals 1.2 times the actuarially fair premium.

a. Will both individuals purchase full insurance at the loaded premium, assuming a choice of either full insurance or self-insurance.

b. Suppose individuals can choose insurance with coinsurance \( c \in [0,1] \) (insurance reimburses \( 1-c \) of the bills). How much insurance (what value of \( c \)) will each individual choose? What will be the premium that each has to pay?

c. Is there a premium at which both individuals would be better off buying exactly the same insurance policy, as compared with remaining self-insured?

4. Many studies have shown that HMOs/MCOs have reduced costs, compared with indemnity health insurers.

a. Explain the various economic theories of why such organizations have lower costs of care, compared with indemnity insurers.

b. Explain what important empirical studies have contributed to an understanding of this phenomenon over the years, and what their findings have been.

c. Finally, comment on the effect that lower costs is expected to have on HMO/MCO premiums.