NAME _________________________________

ECO361: LABOR ECONOMICS
FIRST MIDTERM EXAMINATION
OCTOBER 12, 2006

Prof. Bill Even

DIRECTIONS.

The exam contains a mix of short answer and essay questions. Your answers to the 29 short answer portion of the exam (3 points each unless indicated otherwise) should be listed on the answer sheet attached to the end of the exam. Your answers to the essays (35 points total) should be provided in the space beneath each question.
Consider the data below for September 2006 to answer the 4 questions that follow.

<table>
<thead>
<tr>
<th>Employed</th>
<th>144,850</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civilian labor force</td>
<td>151,799</td>
</tr>
<tr>
<td>Civilian Noninstitutionalized population</td>
<td>226,421</td>
</tr>
</tbody>
</table>

Based on the data provided, provide numerical estimates of each of the following (round your answer to the nearest 0.1 percent, e.g. 7.3%).
1. the unemployment rate
2. the labor force participation rate
3. the labor force

4. Given the above information, suppose that 5 million people who were unemployed quit looking for work. The effect of this change would be that the unemployment rate would \( \text{(rise, fall, not change)} \) and the labor force participation rate would \( \text{(rise, fall, not change)} \).

To answer the next 2 questions, consider the following information. Between 1980 and 2005, the CPI rose from 82.4 to 195.3. The base year for the CPI is 1983.

5. If the nominal wage in 2005 is $10 per hour, what is the real wage in 1983 dollars?

6. A nominal wage of $10 per hour in 2005 would have the same purchasing power as a nominal wage of $_____ in 1980.

7. Suppose that the daily output of a company that replaces car windshields is given by the table below:

<table>
<thead>
<tr>
<th>Labor</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
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<tr>
<td>3</td>
<td>16</td>
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<tr>
<td>4</td>
<td>19</td>
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<tr>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
</tr>
</tbody>
</table>

Assume that the firm receives $100 for each windshield installation and a worker earns $250 per day.

8. if the firm increases the number of workers from 1 to 2, it’s profits would \( \text{(increase, decrease)} \) by $______.

9. what is the marginal revenue product of the second worker?

10. what is the profit maximizing number of workers?
Suppose that a firm is maximizing profits. If the MP of labor and capital are 40 and 80, respectively, and the cost of a unit of labor is $10,

11. What is the price of capital?
12. What is the price of a unit of output?

Suppose that you sell equipment to farmers who grow fruits and vegetables and are considering the impact of reducing the immigration of farm workers into the U.S. on your business. If the U.S. “closes the borders” and reduces the flow of illegal immigrants into the U.S., the supply of farm workers is reduced.

13. This limit on illegal immigration would cause the demand for your equipment to
   a. rise if farm workers are net substitutes for equipment.
   b. fall if farm workers are gross substitutes for equipment.
   c. fall if farm workers are gross compliments to equipment.
   d. none of the above.

14. This limit on illegal immigration would create
   a. a substitution effect that increases demand for your equipment.
   b. a substitution effect that decreases demand for your equipment.
   c. a scale effect that decreases demand for your equipment.
   d. a and c.
   e. b and c.

15. Some states now provide employers subsidies for hiring former welfare recipients. For example, a firm may receive a subsidy of $2 per hour for hiring someone who is currently receiving welfare. This subsidy would have a smaller positive effect on the employment of welfare recipients if the demand for labor was more (elastic, inelastic) or the supply of labor was more (elastic, inelastic) among the welfare population.
   a. elastic; elastic.
   b. elastic; inelastic.
   c. inelastic; elastic.
   d. inelastic; inelastic.

16. Over the years, new technology in shipping has resulted in many dock workers being replaced by machinery. This should generate:
   a. greater bargaining power for dock worker unions because labor demand will be more inelastic.
   b. greater bargaining power for dock worker unions because labor supply will be more inelastic.
   c. less bargaining power for dock worker unions because labor supply will be more elastic.
   d. none of the above.

17. Which of the following conditions does not makes labor demand more elastic?
   a. labor is a smaller share of the total costs of production.
   b. capital is a better substitute for labor.
   c. the substitutes for labor have a more elastic supply.
   d. product demand is more elastic.

18. If the quantity of steel workers demanded falls from 3,000 to 2,000 when the equilibrium wage increases from $19.00 per hour to $20.00 per hour, the own-wage elasticity of demand for these workers is ____. (Round answer to nearest tenth).

19. According to labor supply theory, if a worker's wage rate rises, she will
   a. work less hours only if the substitution effect dominates the scale effect.
   b. work less hours only if the scale effect dominates the substitution effect.
   c. work less hours only if the substitution effect dominates the income effect.
   d. work less hours only if the income effect dominates the substitution effect.
20. According to labor supply theory, an increase in the wage rate is more likely to lead to a decrease in hours worked if:
   a. the person was initially working a relatively large number of hours since the income effect will be larger.
   b. the person was initially working a relatively small number of hours since the income effect will be smaller.
   c. the person was initially working a relatively small number of hours since the scale effect will be smaller.
   d. the person was initially working a relatively large number of hours since the substitution effect will be larger.

To answer the next 3 questions, suppose that a defined benefit plan provides an annuity at retirement equal to 2 percent * years of service * final salary. Jerry started with the firm at age 30 and would have 30 years of service if he retires at 60, he would receive an annual benefit equal to 60% of his final salary. Assume that Jerry will live until age 80 and would therefore expect to collect 20 years of benefits if he retired at age 60; that there is a zero interest rate; and that his final salary will be $50,000 regardless of when he retires.

21. For the pension to be actuarially fair, it would have to increase the annual benefit by $______ for postponing retirement from age 60 to age 61.

22. The size of the actuarially fair increment in the pension increases as interest rates (rise, fall) or as life expectancy (rises, falls).
   a. rise; rises.  b. rise; falls.  c. fall; rises.  d. fall; falls.

23. Suppose that the generosity rate in the above pension was increased from 2.0 to 2.2 percent. If Jerry had originally planned to retire at age 60, this change in the benefit formula would
   a. lead to later retirement.
   b. lead to later retirement only if the wealth effect dominated the substitution effect.
   c. lead to earlier retirement only if the wealth effect dominated the substitution effect.
   d. lead to earlier retirement.

24. An increase in quasi-fixed costs should lead a firm to:
   a. use fewer workers and increase average hours per worker for any given level of output.
   b. use more workers and decrease average hours per worker for any given level of output.
   c. use more labor and less capital to minimize costs for any given level of output.
   d. increase production to cover the added quasi-fixed costs.

25. In recent years, the Social Security Administration has:
   a. increased the rewards for postponing retirement beyond the normal retirement age.
   b. added an earnings test for workers who are over age 65 and collecting Social Security.
   c. increased the early retirement age.
   d. all of the above.

26. Over the past 25 years, the U.S. private pension system has:
   a. shifted from defined benefit to defined contribution plans resulting in higher rewards for postponed retirement.
   b. shifted from defined benefit to defined contribution plans resulting in lower rewards for postponed retirement.
   c. shifted from employee-managed to professionally-managed retirement plans.
   d. both a and c.
   e. both b and c.
Consider the two indifference curves drawn below representing Mary and John’s preferences.

27. Given the indifference curves, it would be correct to conclude that:
   a. For any given number of leisure hours, John is willing to give up an hour of leisure for less additional money than Mary.
   b. John has a lower wage rate than Mary
   c. John has a lower reservation wage rate than Mary
   d. none of the above.

Consider the diagram drawn below for a monopsonist to answer the two questions that follow.

28. The profit maximizing wage and number of workers for the above monopsonist is:
   a. W0 and N0  
   b. W1 and N1  
   c. W2 and N0.  
   d. none of the above.

29. A minimum wage would cause the profit maximizing level of employment to
   a. rise if the minimum wage is anywhere between W0 and W2.
   b. fall if the minimum wage is anywhere above W0.
   c. rise if the minimum wage is anywhere above W2.
   d. none of the above.
1. (15 points) Suppose that there is no overtime law in effect. The government now imposes an overtime law mandating that “time-and-a-half” be paid for all work over 40 hours per week.

a. Draw a budget line below indicating the effect of this new overtime rule on the budget constraint by showing the budget constraint before and after the overtime law is imposed. Assume $20 of weekly non-labor income and a $10 hourly wage rate. Incorporate the numeric information on hours and wages into your graph.

b. Based on the diagram above, if a person was originally working 50 hours per week, will this overtime law cause the worker to prefer more or less work hours? EXPLAIN.

If the person was previously working 50 hours per week, the overtime law will create both an income and substitution effect. The overtime law causes this worker’s income to be higher at the original hours worked, and hence the income effect encourages the person to work fewer hours. The substitution effect encourages the worker to work more hours because the rewards for an additional hour of work have increased from $10 to $15. The net effect is ambiguous.

c. Based on what you know about a firm’s optimal mix of hours per worker and number of workers, how will this overtime law affect firms’ preferences regarding weekly hours, assuming that workers were initially working 50 hours per week? EXPLAIN.

A firm chooses a mix of hours per worker and number of workers so that \( \frac{MPm}{Q+WH} = \frac{MPh}{WN} \) where \( MPm \) and \( MPh \) reflect the marginal products of another worker and another hour of work for all workers, respectively; \( w \) is the wage rate, \( Q \) is the quasi-fixed cost per worker, and \( N \) is the number of workers.

The overtime law increases \( W \) and thus causes \( \frac{MPm}{Q+WH} > \frac{MPh}{WN} \). To return to an optimal mix of workers and hours, the firm should add more workers and have each of them work fewer hours. This will gradually reduce \( MPm \) and increase \( MPh \) and restore the conditions for cost minimization.
2. (10 points) Suppose that a hospital is considering a training program for its nurses. The managers estimate that the training program would result in a $1000 annual increase in revenue from the nurse and that the training program would cost $2000 per trainee.

a. Using the terminology developed in class, under what conditions should the hospital invest in this training program for its nurses? Be sure that you discuss all of the relevant considerations.

First, the firm should invest in this training only if it can recoup the $2000 training cost by paying a wage below the worker’s marginal product after the training is complete for a sufficient number of years. For example, (assuming a zero interest rate) if the firm can pay the worker $500 below her MP for and retain the worker for 4 or more years, it would be profitable to invest in the training.

If the training is general, the training increases the worker’s MP at hospitals and the firm cannot pay the worker a wage below MP because the worker can leave to other firms and receive W=MP. Hence, the firm should not recoup its costs if the training is general unless they can prevent the worker from moving elsewhere. If, on the other hand, the training is specific, the worker’s MP is higher at the hospital that provides the training than it is elsewhere. This allows the hospital to pay W<MP and recoup its costs.

b. If all nurses signed a “noncompete clause” with the hospital, how would this alter your answer in (a)? EXPLAIN.

If the nurses sign a noncompete clause, they are prohibited from taking a job with a competitor (likely another hospital). In this case, the firm could pay the worker W<MP even if the training is general because the worker cannot accept a W=MP at a competing firm. Hence, a noncompete clause makes it possible for a firm to recoup its investment in general training.
3. (10 points) Consider the following unemployment insurance system: If a worker has between zero and $100 of earnings, the benefit is $250 per week. For every dollar earned above $100 per week, the benefit is reduced by $.50 per week. If the worker earns more than $150 per week, no benefit is paid.

a. On the diagram above, draw the budget constraint for a person eligible for unemployment insurance. Assume the worker has $20 per week of non-labor income and could accept a job at $10 per hour. Provide numeric detail in the graph consistent with the information provided.

The budget line is the solid line given in the above diagram.

b. What range of work hours would be “irrational” for this worker, given her eligibility for unemployment? Why?

It would be irrational for the worker to work more than 15 but less than or equal to 37.5 hours per week. The reason is that this range of the budget constraint generates less income for more hours of work than 15 hours per week with $395 of total income.
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