The exam contains a mix of short answer and essay questions. Your answers to the 22 short answers (2 points each) should be listed on the answer sheet attached to the end of the exam. No credit will be given for answers placed elsewhere. Your answers to the essays (55 points total) should be provided in the blue book provided.

You have until 3:35 to complete the exam. If you wish to purchase additional time, you may do so at a price of 5 percentage points per minute. When you complete the exam, place your exam and answer sheet inside of the bluebook.
To answer the next 4 questions, use the following labor force data for January 2013. (All numbers are in 1000s)

Civilian non-institutional working age population 244,863
Civilian labor force 155,654
Employment-population ratio 58.6%

1. What is the unemployment rate in January 2013?

2. What is the labor force participation rate in January 2013?

3. If the civilian non-institutional population grows by 1% over the next year and the labor force participation rate remains constant, how many jobs must be created over the next year to leave the unemployment rate unchanged? (Be sure to note that the numbers above are in 1000s of workers and to properly scale your answer to reflect this.)

4. If there is no change in the civilian non-institutional population over the next year, but the labor force participation rate rises by 1%, how many jobs must be created over the next year to leave the unemployment rate unchanged? (Be sure to note that the numbers above are in 1000s of workers and to properly scale your answer to reflect this.)

5. If discouraged workers become encouraged by recent improvements in the job market and beginning searching for jobs, this would cause the unemployment rate to _____, the labor force participation rate to _____, and the employment population ratio to _____.
   a. Rise; rise; not change
   b. Rise; rise; fall
   c. Not change; rise; fall
   d. Rise; not change; not change
   e. None of the above.

6. Over the past decade, the labor force participation rate
   a. Fell for the overall population
   b. Fell more for men than women
   c. Fell more for teenagers than the overall population
   d. All of the above.
Between 1964 and 2010, the CPI (base year 1983) rose from 20.9 to 231.0. The average nominal wage rate for non-supervisory production workers rose from 2.50 to 19.97.

7. Based on the information provided, between 1964 and 2010, the real wage (rose, fell) from ____ to _____.

8. A nominal wage of $10 per hour in 2010 would have the same purchasing power as a nominal wage of _____ in 1964. (Give your answer to the nearest cent – e.g. $3.21.)

To answer the next 2 questions, suppose that an apple orchard operates in perfectly competitive product and labor markets. It can sell a bushel of apples for $10 and the marginal product of an hour of labor is 2 bushels of apples and the average product of labor is 3 bushels of apples.

9. If the firm must pay a wage rate of $15 per hour and hires another worker, its profits will
   a. rise by $5  
   b. rise by $15  
   c. fall by $5  
   d. fall by $15

10. Suppose that the marginal product of capital at the apple orchard is 10 bushels of apples and the price of capital is $80. If the wage for labor is $15 and the marginal product of labor is 2 bushels of apples, the firm:
    a. Could produce the same amount of apples at a lower cost by using more labor and less capital
    b. Could produce the same amount of apples at a lower cost by using more capital and less labor
    c. Cannot produce the same amount of apples at a lower cost by changing the mix of labor and capital
    d. Might be able to produce the same amount of apples at a lower cost by changing the mix of labor and capital, but it is impossible to tell without more information.
To answer the next two questions, assume that a firm is faced with the following labor supply curve and must pay all workers the same wage rate (i.e. no wage discrimination).

<table>
<thead>
<tr>
<th># of workers</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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</thead>
<tbody>
<tr>
<td>Wage</td>
<td>$10</td>
<td>$11</td>
<td>$12</td>
<td>$13</td>
<td>$14</td>
</tr>
<tr>
<td>Marginal product</td>
<td>15</td>
<td>12</td>
<td>9</td>
<td>6</td>
<td>3</td>
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</tbody>
</table>

11. What is the marginal expense of the sixth worker?

12. If the firm sells its product in a competitive product market for a price of $2, how many workers should be hired to maximize profits?

13. Labor economists argue that unions will be more successful at organizing workers when labor
   a. demand is more inelastic since wage increases would lead to smaller employment losses.
   b. demand is more elastic since wage increases would lead to smaller employment losses.
   c. supply is more inelastic since wage increases would lead to smaller employment losses.
   d. supply is more elastic since wage increases would lead to smaller employment losses.

14. We discussed in class the difference between less than truckload (e.g. UPS) and truckload shipping. The discussion emphasized that unions would have greater bargaining power in the
   a. less than truckload industry because it has more inelastic product demand
   b. less than truckload industry because its capital is a better substitute for labor.
   c. truckload industry because it has more elastic product demand
   d. truckload industry because its capital is a poorer substitute for labor.
15. According to the Hicks-Marshall Laws of derived demand, labor demand is more elastic when:
   a. Labor is a larger share of total cost since the substitution effect of a wage increase would be larger.
   b. Labor is a larger share of total cost since the scale effect of a wage increase would be larger.
   c. Product demand is more elastic since the scale effect of a wage increase would be larger.
   d. Both a and c.
   e. Both b and c

16. Suppose that the federal government introduces an investment tax credit thereby reducing the after-tax price of new equipment to business. The lower price of equipment purchases would:
   a. Increase the demand for labor.
   b. Decrease the demand for labor.
   c. Increase the demand for labor only if capital and labor are gross substitutes.
   d. Increase the demand for labor only if capital and labor are gross complements.

17. If the quantity of labor demanded for nurses rises from 10 million to 11 million when the equilibrium wage falls from $25 to $24, the own-wage elasticity of demand for nurses is _____. (Use the midpoint formula developed in class and give your answer to 2 decimal places – e.g. 1.23.)

18. If the elasticity of demand for labor is .1, a 10% increase in the wage rate will cause employment to fall by ____ % and cause total income received by workers to (rise, fall) by ____ %. [Be sure to indicate whether income would rise or fall in your answer!]

19. Suppose that the interest rate is 4% and a worker is offered $100,000 today, $120,000 one year from today, and $140,000 two years from today. What is the present value of the three years of pay combined? Round your answer to the nearest dollar.

To answer the next 2 questions, suppose that the labor supply and labor demand curves for nurses are given by:

\[ LS = 100 + 3W \]
\[ LD = 700 - 1W \]

20. If a $1 tax is imposed on workers, the equilibrium after-tax wage received by employees will be _______.
21. If a $1 tax is imposed on employers, the equilibrium after-tax wage received by employees will be ______.

Table 5.1 Two-Period Training Model

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>W0</td>
<td>wage in first period</td>
</tr>
<tr>
<td>W1</td>
<td>wage in second period</td>
</tr>
<tr>
<td>MP0</td>
<td>marginal product of labor in first period</td>
</tr>
<tr>
<td>MP1</td>
<td>marginal product of labor in second period</td>
</tr>
<tr>
<td>MP**</td>
<td>marginal product of labor in other jobs</td>
</tr>
<tr>
<td>Z</td>
<td>cost of training</td>
</tr>
<tr>
<td>W*</td>
<td>market wage for firms offering single period job</td>
</tr>
</tbody>
</table>

22. A profit-maximizing firm which wants to provide firm-specific training to its workers will pay ______ in the training period and ______ after training is completed. (See the above table for definitions of abbreviations.)
   a. less than W*, less than MP1 but more than W*
   b. more than MP1; more than MP2
   c. W*; W*
   d. more than W*; less than MP1 but more than W*
Place your answers to the next questions in the blue book provided.

1. (15 points) President Obama has proposed that the federal minimum wage be increased from $7.25 to $9.00 per hour. Currently, there are slightly over 12 million workers who would be directly affected by this increase (i.e. paid between $7.25 and $9.00). Two of the largest employers of affected workers are restaurants (2.5 million) and grocery stores (775,000).

   a. Relative to total costs, the wages of minimum wage workers are a larger share of total cost at restaurants than at grocery stores. Given this fact, would you expect that the percentage of workers who lose jobs would be greater at restaurants or grocery stores? Justify your answer with an explanation of why the scale and/or substitution effect of the minimum wage increase would differ in the two industries.

   If labor is a larger share of total cost at restaurants, the scale effect of a higher wage will be greater because there will be a greater increase in their cost of production and the product supply curve will shift further to the left. Consequently, the elasticity of labor demand will be greater and the percentage reduction in employment will be greater in the labor intensive industry (restaurants).

   b. Many would argue that the demand for restaurant food is more elastic than the demand for grocery food. Given this fact, would you expect that the percentage of workers who lose jobs would be greater at restaurants or grocery stores? Justify your answer with an explanation of why the scale and/or substitution effect of the minimum wage increase would differ in the two industries.

   If product demand is more elastic at restaurants, any given leftward shift in the product supply curve caused by higher wages will lead to a larger reduction in the equilibrium quantity and a larger scale effect. Consequently, the elasticity of labor demand will be greater and the percentage reduction in employment will be greater where product demand is more elastic (restaurants).

   c. Many cooks in restaurants currently earn above the minimum wage whereas most dishwashers and servers are paid the minimum. Would the increase in the minimum wage be likely to increase or decrease employment of cooks? Explain.

   A higher minimum wage will create both scale and substitution effects for cooks. The scale effect will reduce the demand for cooks as restaurant production falls and the demand for all types of restaurant workers is reduced. The substitution effect will increase the demand for cooks as restaurants begin to substitute cooks for relatively more expensive dishwashers and servers. If the cooks and the other workers are gross substitutes (i.e. the substitution effects dominates the scale effect), the demand for cooks will rise. If they are gross complements, the demand for cooks will fall.
2. (15 points) The Patient Protection and Affordable Care Act (commonly called Obamacare) has a number of provisions. One provision is that, starting in 2014, the federal government will impose an annual $2,000 per employee penalty on employers with more than 50 employees who do not offer health insurance to their full-time workers. Full-time is defined as an employee who is employed on average at least 30 hours per week.

a. Many commentators have pointed out that firms might just switch from full-time to part-time workers to avoid the law. However, others point out that this ignores the fact that some firms face substantial hiring or training costs. **Explain how and why** training costs could alter a firm’s willingness to replace full-time with part-time workers as a result of this new law.

If a firm switches from 1 full-time worker at 40 hours to 2 part-time workers at 20 hours, it could avoid a $2000 penalty for the worker that was previously full-time. At the same time, this would mean that it would have to hire and train twice as many workers. **If hiring and training costs are high, the additional training costs could exceed the savings from avoiding the penalty. In general, a firm will be more reluctant to pursue this strategy when there are high quasi-fixed costs since the increase in quasi-fixed costs from hiring workers could exceed the savings from avoiding the penalty.**

b. Setting aside the issue of the number of hours versus number of workers, some commentators point out that this penalty is like a tax on labor. The effects of such a tax can vary considerably across sectors of the economy. For example, agricultural production is fairly land and capital intensive, whereas some segments of the services industry are fairly labor intensive (e.g. restaurants, nursing homes). Based on these differences, where would you expect the new penalty to have the larger percentage effect on employment? **Explain using theories developed in this course.**

According to the *Hicks-Marshall Laws of Derived Demand*, labor demand is more elastic when labor is a larger share of total cost because the scale effect of any wage increase will be greater. Moreover, when labor demand is more elastic, a payroll tax will lead to larger reductions in the equilibrium level of employment. **Therefore, I would expect the effect of the penalty would create more job loss in the labor intensive service sectors.**

c. Another factor that could influence the impact of the penalty on employment is the extent to which an industry faces import competition. For example, manufacturing is generally more open to competition from overseas than services. Based on these differences, where would you expect the new penalty to have the larger percentage effect on employment? **Explain using theories developed in this course.**

When there is more import competition, product demand is more elastic since consumers have more substitutes available for the domestically produced product. According to the *Hicks-Marshall Laws of Derived Demand*, this will lead to more elastic labor demand because the scale effect of any wage increase on the demand for labor will be greater. **As a result, I would expect the penalty would have a larger effect on manufacturing industries since they will have more elastic product and labor demand.**
3. (15 points)
   a. Describe the difference between firm specific and general training and explain why this
difference is critical in determining whether a firm is willing to “pay” for the training.

   Upon completion of general training, a worker’s MP is increased at all potential
employers. Upon completion of specific training, a worker’s MP is increased only at the
firm that provided the training. With general training, a firm must pay a worker his full
MP after training or he will leave to another firm who is willing to pay that amount. This
makes it impossible to recoup any investment in the training upon completion. With
specific training, the firm can retain the worker by paying a wage above his MP at the
competing firm but below his MP at the training firm. Paying the worker less than his MP
at the training firm makes it possible to recoup the investment in training.

   b. Describe what is meant by “deferred pay” and explain why training affects a firm’s desire
to use such a policy.

   Deferred pay is when a firm pays a worker less than the wage she could earn at her
next best alternative early in the career but offsets this by paying more than her MP at
the end of her career. To compete with other firms, the PV of the deferred pay
package must match or exceed that offered by the competing firms. Firms that pay
for training benefit from such a policy since it reduces the chance that the worker will
quit and makes it more likely that the firm will recoup its investment in training.

   c. Explain why a worker might be reluctant to accept a deferred pay contract.

   A worker might be reluctant to accept a deferred pay contract for a few reasons. First,
the firm might go bankrupt and the worker would then have to switch to a new firm and
not receive the “bonus” she was promised. Second, the firm might cheat on the
promise and pay above the worker’s next best alternative but less than originally
promised. Third, the workers might have a high discount rate and prefer to be paid early
than late.
3. (10 points) Over the past several years, the airline industry has had several mergers (e.g. Delta and Northwest, United and Continental, and a pending merger between USAir and American). As the number of airlines shrinks, the level of competition in the labor market for pilots (and other airline workers) is reduced. In the extreme, one might consider this akin to moving from a competitive to a monopsonistic labor market. Use a diagram to illustrate how this change in the structure of the labor market would affect the wages and employment for airline pilots. Be sure to label your curves clearly and provide a written discussion of how the diagram illustrates the wage and employment effects.

With the competitive labor market, equilibrium employment is where labor supply and labor demand are equal (W0 and E0 in the diagram below). With the monopsonistic market, firms hire up until $\text{MRP}_L = \text{ME}_L$ and pay the wage required to achieve that level of employment (W1 for E1). Consequently, a shift from a competitive to monopsonistic labor market will lead to lower wages and lower employment for pilots.
4. (10 points) Explain **how and why** firm investments in training could affect the number of people that it lays off when there is a downturn in product demand. Use a diagram to illustrate how a downturn in product demand affects the profit maximizing level of employment and use the diagram to discuss how training affects the optimal response to a change in product demand.

When a firm trains its workers, it must pay a real wage below the worker’s marginal product to recoup its investment. An illustration of this is in the diagram below where a training firm is pay W/P0 and hiring E1 workers. During a recession, the firm’s product price drops which drives up the worker’s real wage. In the diagram below, prices would have to drop enough to push the real wage above W/P1 before the firm would start laying off workers. Without training, the firm would pay a real wage equal to the worker’s MP (e.g. W/P0 and E0). Since there is no wedge between the real wage and the MP, as soon as prices fall, the firm begins to lay off workers.
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