The exam contains a mix of short answer and essay questions. Your answers to the 18 short answer portion of the exam (3 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 (50 points total) should be provided in the space provided beneath each question. You have 80 minutes to complete the exam. If you wish additional time, you may purchase it at price of 5 percentage points per minute.
Consider the two indifference curves drawn below representing the preferences of Jill and Jack, and the budget constraint that they both share.

1. Given the information provided, Jack and Jill both have non-labor income of $______ and an hourly wage rate of $______.

2. Given the information provided, Jack has a reservation wage that is (greater, less) than Jill’s reservation wage.
   a. greater
   b. less

3. Given the information provided, Jack (will, will not) work and Jill (will, will not work).
   a. will; will
   b. will; will not
   c. will not; will not.
   d. will not; will

4. According to labor supply theory, if a worker’s wage rate rises, she will
   a. definitely work more hours
   b. definitely work less hours
   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.

5. The Social Security system used to apply an earnings test to people beyond age 65 who collected Social Security benefits and earned more than $17,000. Anyone who earned more than $17,000 and was collecting Social Security had benefits reduced by $1 for every $3 earned over the $17,000 limit. In 2000, the earnings test was eliminated for workers over age 65. Suppose that prior to 2000 when the earnings test was still in place, John was earning exactly $17,000 from his job and collecting Social Security. Elimination of the earnings test would lead to
   a. an ambiguous effect on John’s work hours since the wealth effect would cause him to work less but the substitution effect would cause him to work more.
   b. an ambiguous effect on John’s work hours since the wealth effect would cause him to work more but the substitution effect would cause him to work less.
   c. a decrease in John’s work hours since the wealth effect would cause him to work less and there is no substitution effect.
   d. an increase in John’s work hours since the substitution effect would cause him to work more and there is no wealth effect.
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 35 and would have 30 years of service if he retires at 65, he would receive an annual benefit equal to 60% of his final salary. Assume that Jerry will live until age 85 and would therefore expect to collect 20 years of benefits if he retired at age 65; that there is a zero interest rate; and that his final salary will be $100,000 regardless of when he retires.

6. For the pension to be actuarially fair, it would have to increase the annual benefit by $_____ for postponing retirement from age 65 to age 66.

7. The size of the actuarially fair increase rises as interest rates (rise, fall) or life expectancy (rises, falls).
   a. rise; rises.  b. rise; falls.  c. fall; rises.  d. fall; falls.

8. 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 65, 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 later retirement only if the substitution effect dominated the wealth effect.
   d. lead to earlier retirement.
To answer the next 4 questions, refer to the diagram drawn below. The indifference curves for worker types X and Y are given by X0, X1 and Y0, Y1. The iso-profit curves for firm types A and B are given by A1 and B1.

9. Based on the diagram above, one can conclude that
a. for any given level of risk, it is less costly for type A firms to reduce risk than type B firms.
b. for any given level of risk, it is less costly for type B firms to reduce risk than type A firms.
c. point R leads to lower profits than point O for a type A firm
   d. both a and c.
   e. both b and c.

10. Based on the diagram above, one can conclude that:
   a. type X workers are more averse to risk than type Y workers
   b. type X workers are less averse to risk than type Y workers.
   c. a type X workers would prefer point R over point O, but type Y workers would prefer point O over point R
   d. both a and c.
   e. both b and c.

11. Based on the above diagram, suppose that there are both type A and type B firms in the market and type X and Y workers. Also, assume that the market is competitive and that B1 and A1 represent isoprofit curves with zero profits. We can conclude that the equilibrium will result in type Y workers employed by type (A,B) firms. Compared to type Y workers, type X workers will earn (higher, lower) wages and be exposed to (higher, lower) risk.
   a. A; higher; lower.
   b. A; lower; higher
   c. B; higher; lower
   d. B; lower; higher
   e. none of the above.

12. If a new technology is discovered that makes it less costly to reduce risk at type A firms, we would expect that the isoprofit curve would become (flatter, steeper) and type A firms would move to a compensation package that included
   a. flatter; lower wages and less risk.
   b. steeper; lower wages and less risk.
   c. steeper; higher wages and less risk.
   d. flatter; higher wages and less risk.
13. Suppose that workers of equal skill are in two jobs that differ only in terms of the risk of death. On job A, workers are paid $40,000 per year. On job B, workers are paid $35,000 per year. The annual risk of death on job A is .0001 and the risk on job B is .00005. Based on this information, what is the corresponding “statistical value of a life”?

14. Statistical value of life (SVL) estimates like the one in the previous question tend to be
   a. an overstatement of the true SVL for the type of workers who accept the low risk jobs.
   b. an understatement of the true SVL if there are ex post awards for those who realize the risk (e.g. life insurance payouts for those who die)
   c. an overstatement of the true SVL if, for example, nonfatal risk is greater in jobs with high fatal risk.
   d. all of the above.
   e. only b and c.

To answer the next 4 questions, consider the diagram below which provides a firm’s zero-iso-profit curve (xx) and a worker’s indifference curve (yy) between the hourly wage rate and the time of day that workers begin work each day.

15. Based on the diagram provided, holding wages constant, firms would realize the greatest profit if workers started their work day:
   a. at 7 a.m.
   b. between 7 and 8 a.m.
   c. at 8 a.m.
   d. after 8 a.m.

16. Based on the diagram provided, holding wages constant, workers would be happiest to start their work day:
   a. at 7 a.m.               b. between 7 and 8 a.m.
   c. at 8 a.m.             d. after 8 a.m.

17. Suppose all workers and all firms are identical to those represented by the above indifference curve and isoprofit line. In equilibrium, we should expect to see that workers start their day:
   a. at 8 a.m.               b. after 8 a.m. but before 9 a.m.
   c. at 9 a.m.             d. after 9 a.m.
18. When the average difference of earnings between college graduates and high school graduates is used to estimate the “return” to a college degree, the estimated return to education would be:
   a. biased upward if more able workers are more likely to go to college.
   b. biased downward if earnings differences don’t account for the fact that college graduates generally have more generous fringe benefit packages than high school graduates.
   c. biased upward if taxes are ignored when calculating the earnings difference and there is a progressive income tax.
   d. all of the above.
   e. only b and c.
1. (20 points) The North Carolina unemployment insurance (UI) system provides a weekly benefit equal to one half of average weekly earnings (AWE) during a specified base period prior to filing for unemployment, but no more than $500 per week. If a person works while collecting UI, they can earn up to 10% of AWE without any reduction in benefits. The weekly UI benefit is reduced by $1 for each $1 earned above the cut-off.

a. In the space below, draw the budget line for a hypothetical worker names Chris making the following assumptions:
   - Chris had AWE of $400 prior to the unemployment spell
   - Chris can currently accept a job paying a wage of $10 per hour
   - Chris has $100 of weekly non-labor income (not counting her UI benefit).

   Be sure to provide the numerical values corresponding to any points (both total income and hours) where there is a change in the slope of the line. Also, label the points where the line intersects the vertical axes for both 0 and 80 hours per week.

b. Suppose that the system was changed so that a person could earn up to 30% of AWE without any reduction in benefits. Illustrate how this would affect the budget line by drawing a new “dashed segment” on top of the budget line you drew for part a. Label the points where there is any change in the slope of the new budget line.
c. Suppose that a person was earning exactly 10% of AWE under the original program. Would the switch to the new program (given in b) cause this person to work more or less hours? Justify your answer with reference to the direction of income and/or substitution effects.

This person would be working 4 hours under the old system and would be at point A in the above diagram. With the new program, the reward to additional work is increased from $0 to $10 at point A and thus a substitution effect of more work is created. At point A, there is no change in total income, so there is no income effect. Consequently, the new program should cause this person to work more hours.

d. Suppose that a person was earning enough that they were not eligible for benefits under the old program. Would a switch to the new program increase, decrease, or have no effect on this person’s work hours? Explain.

Anyone working more than 24 hours under the old system would not receive a benefit. For someone working between 24 and 32 hours under the old system, a switch to the new system would lead to an income and substitution effect that would reduce work hours. The income effect reduces hours because the person’s income is increased holding hours worked constant. The substitution effect reduces hours because the reward to increased work effort went from $10 to $0 per hour.

People working over 32 hours may also choose to work fewer hours. There is no income effect, but it is possible that the reduced penalty for cutting back work hours would lead them to 12 hours per week. Such an example is illustrated by the indifference curve drawn on the diagram.
2. (10 points) According to a recent January 2011 Wall Street Journal article: The Occupational Safety and Health Administration said Wednesday it will withdraw a proposal to toughen requirements for what employers had to provide to protect workers' hearing in loud environments, by changing its interpretation of what would be "feasible" for them.

a. If the new standards had been implemented, many employers would have been required to add noise dampening systems on their equipment instead of providing workers with personal protection (e.g. ear plugs). Suppose that a manufacturing firm (call it ACME) previously provided ear plugs and would be required to incur the cost of adding noise dampening systems if the new OSHA rules had been passed. Discuss whether these tougher standards would make ACME workers better or worse off, or whether the effect is uncertain.

The theory of compensating differences suggests that workers who were exposed to loud noises should have received a "compensating difference" for the risk that they are exposed to. Moreover, the fact that they accepted such jobs suggests that they are willing to accept the risk for an amount that is less than or equal to the compensating difference they receive. The "rent" that these workers receive will be eliminated if OSHA would impose this mandate because as the risk is eliminated, the employees will no longer receive the compensating difference. While they face less risk, the workers placed greater value on the added wages than the risk and they are thus worse off.

b. Suppose that ACME has health insurance that would pay for treatment of any hearing damage (e.g. purchase of hearing aids) that their workers experience. Describe how the extent of “experience rating” in the ACMEs health insurance premiums alters the desirability of the tougher OSHA mandate. Be sure to define what is meant by “experience rating” in your answer.

If health insurance is experience rated, then ACME would receive lower premiums if they reduce risk and health claims for their employees. If the health insurance is not experience rated, any added claims created by exposure to noise at ACME is shared by all insurance buyers. Thus, without experience rating, there are “insurance externalities” and others are forced to assist ACME in paying for the exposure of their workers to noise. Such insurance externalities are an important reason that it may make sense for the government to regulate the risk levels that employers and employees agree to.
3. (10 points) John is a 65 year old single man and just retired. He is eligible for Social Security benefits, but trying to decide whether to file for benefits this year or next. If he waits to age 66, he will receive a monthly benefit that is 8% higher. John would like some help trying to decide whether he should apply now or wait a year to start his Social Security.

a. Describe what calculations you would perform to assist him in his decision. Be sure to define any notation you use in defining the relevant mathematical calculations. You can ignore tax issues in your answer.

If John retires at age 65 and collects $B$ per year for $N$ remaining years of life-expectancy, assuming an interest rate of $r$, the present value of his life-time benefits will be:

$$PV(65) = B + \frac{B}{(1+r)} + \frac{B}{(1+r)^2} + \cdots + \frac{B}{(1+r)^{N-1}}$$

If he waits until age 66 to retire, the PV of his benefits will be:

$$PV(66) = 1.08 \left[B + \frac{B}{(1+r)} + \frac{B}{(1+r)^2} + \cdots + \frac{B}{(1+r)^{N-1}}\right]$$

John should choose to file for Social Security at age 65 only if the PV of his benefits is higher at age 65 than 66. Whether the PV is higher at 65 or 66 will depend upon the interest rate and his remaining life expectancy.

b. If John tells you that he is very healthy and expects to have a much longer life than the ordinary 65 year old, how would this affect your advice? Justify by reference to the calculations you describe in (a).

The healthier John is and the greater his remaining life expectancy, the greater the chance that retirement at age 66 will make sense. The reason is that $PV(66) - PV(65) = PV$ of $.08B$ for $(N-1)$ years minus $B$. As the number of remaining years of life-expectancy rises, the greater is the likelihood that the PV of the extra 8 percent per year will exceed the loss of one years of benefits.
4a (10 points) Some economists argue that “twins studies” provide a more accurate estimate of the returns to a college education. Explain what problem twin studies “fix” and how such studies alter the estimated return to education.

To estimate the rate of return to a college education, one must determine how much a college degree increases earnings. One might do this by comparing the average earnings of a high school and college graduate. However, this earnings difference could overstate the true increase in earnings associated with a degree because the people who attend college may have higher ability or motivation than those who do not. As a result, some of the earnings difference between college and high school graduates might be due to differences in ability, motivation, or family background.

Twins studies can reduce the bias in the estimate. If one twin goes to college and the other does not, the earnings difference is a more accurate estimate of the return to a college degree because the twins share a common family background, and in the case of identical twins, identical genetic background.

4b. Explain how and why the expectation of a career interruption would affect the chance that women pursue jobs with general as opposed to specific human capital.

General human capital includes skills that are valuable at a wide range of employers. Specific human capital includes skills that are valuable at only a single employer. If a woman anticipates a career interruption, she will find it to her advantage to have general human capital since it will make it easier to find a new employer without a significant wage reduction upon her return to work. With specific human capital, when she tries to return to work, she will find that only her previous employer places much value on her skills and she will be more likely to experience a significant wage cut.
5a. (10 points) Provide a brief description of “non-discrimination” rules and explain how such rules cause a worker’s share of compensation received as fringe benefits to be related to the average compensation of co-workers.

Non-discrimination rules require that an employer provide a similar fringe benefit package to all workers. Since higher income workers generally prefer a larger share of compensation in the form of fringe benefits because of the greater tax advantages they receive, fringe benefits as a share of compensation usually rises with income. However, since non-discrimination rules require a similar fringe benefit package for all workers, the share of compensation in fringes will lie somewhere between what’s optimal for the high and low income workers. The greater the share of employees that are in the high income bracket, the more important it is to provide the share that is optimal for those employees. In general then, as the average compensation of the workforce rises, the greater the share of compensation in fringe benefits.

5b. Explain how non-discrimination rules may cause a firm to sub-contract certain job functions (e.g. Miami leases bus drivers instead of employing its own bus drivers).

Because of non-discrimination rules, if Miami employed its own bus-drivers, it would have to give them the same fringe benefit package that all university employees receive. These fringe benefits may cost $15,000 per year, but the bus-drivers might be happier with a smaller amount of fringes and more cash compensation (e.g. they may be willing to give up $10,000 of fringe benefits if given $8,000 of additional wages). By sub-contracting, a separate company can offer the fringe package that is optimal for bus-drivers and reduce the total cost for bus-services.
**Eco361, Fall 2011, Prof. Bill Even**  
**Second Midterm Examination**

Name _____________________________________________________

---

**ANSWER SHEET**

1. $100; $9
2 A
3 A
4 D
5 D
6 \( \frac{60,000}{19} = \$3158 \)
7 B
8 C
9 D
10 E
11 E
12 A
13 \( \frac{5000}{(.0001-.00005)} = \$100 \text{ million} \)
14 E
15 C
16 D
17 B
18 D