Always show all your work, so that you can receive partial credit. An answer with no explanation will receive zero credit. Use extra pages if necessary, but make sure you clearly indicate where the rest of your answer is.

1. You have an income of $80 to spend on movie tickets and the composite good (all other goods), Y. Movie tickets cost $8 per ticket and Y costs $16 per unit.
   a. Write an equation for your budget constraint: \( \frac{M}{P_y} = \frac{P_x}{P_y} X \)
      \[ Y = \frac{80}{16} - \frac{8}{16} X = 5 - \frac{1}{2} X \]
   b. If you spent all your income on movie tickets, how much could you buy?
      \( \frac{M}{P_{\text{movietickets}}} = \frac{80}{8} = 10 = x - \text{intercept} \)
   c. What is the opportunity cost of movie tickets in terms of Good Y?
      You have to give up 1/2 units of Y to get one movie ticket. The opportunity cost is the absolute value of the slope of the budget constraint.
   d. If you spent all your income on Good Y, how much could you buy?
      \( \frac{M}{P_y} = \frac{80}{16} = 5 = y - \text{intercept} \)
   e. Graph your initial budget constraint and label it BC_0.
   f. Suppose the price of movie tickets increases to $10 while everything else stays the same. Write down your new budget equation and graph the new budget constraint; label it BC_1.
      \( Y = \frac{80}{16} - \frac{10}{16} X = 5 - \frac{5}{8} X \)
   g. Suppose your income increases to $96 while the prices of both commodities remain at $8 for movie tickets and $16 for Y. Write down your new budget constraint and graph the new budget constraint and label it BC_2.
      \[ Y = \frac{96}{16} - \frac{8}{16} X = 6 - \frac{1}{2} X \]
   h. On your diagram, shade in the area representing commodity bundles that you can afford with the budget in part (g) but could not afford to buy with the budget in part (a).

2. Ed spends all his income on 10 Foo Fighter CDs and 4 bowling balls. All Foo Fighter CDs are $10/per CD and bowling balls are $50.
   a. What is Ed’s income? \( M = P_x X + P_y Y = 10*10 + 4*50 = $300 \)
   b. If the price of Foo Fighter CDs increased to $20 per CD, but the price of bowling balls stayed the same how much would Ed’s income have to rise so that he could still afford his original bundle of goods?
      \( M = P_x X + P_y Y = 20*10 + 4*50 = $400 \), it would have to rise by $100.
3. Your budget is such that if you spend your entire income, you can afford either 4 units of good \( x \) and 6 units of good \( y \) or 12 units of \( x \) and 2 units of \( y \).

   a. Mark these two consumption bundles and draw the budget line.
   
   b. What is the ratio of the price of \( x \) to the price of \( y \)?

   \[
   \text{Slope of the BC } = \frac{1}{2}
   \]

   c. If you spent all of your income on \( x \), how much \( x \) could you buy? 16

   d. If you spent all of your income on \( y \), how much \( y \) could you buy? 8

   e. Write a budget equation that gives you this budget line, where the price of \( x \) is 1.

   \[
   \begin{align*}
   M &= P_x x + P_y y \\
   16 &= 1x + 2y \\
   y &= 8 - \frac{1}{2} x
   \end{align*}
   \]

   f. Write another budget equation that gives you the same budget line, but where the price of \( x \) is 3.

   \[
   \begin{align*}
   M &= P_x x + P_y y \\
   48 &= 3x + 6y \\
   y &= 8 - \frac{1}{2} x
   \end{align*}
   \]
4. An advertisement on TV promises that if you dial a toll free number, you can talk long distance for 20 minutes at a rate of $.05/minute. The fine print at the bottom of the advertisement informs you that for every minute you go over 20 minutes, the cost per minute is $.10. If you have $5 to spend on phone minutes and all other goods, Y, where the price of Y is $1, draw this budget constraint:

If you spend all your income on good Y, you can buy $5/1 = 5 units of good Y.

The opportunity cost of a minute of phone time in the first 20 minutes is $P_{\text{phone time}}/P_Y = 0.05/1 = 0.05$, so the slope of the budget constraint between 0 and 20 minutes of phone time is –0.05.

After the first 20 minutes, the price of a phone call increases to $.10 a minute, so the opportunity cost increases to $P_{\text{phone time}}/P_Y = 0.10/1 = 0.10$. This means the slope of the BC increases to –0.10.

The x-intercept occurs at 60 minutes of phone time. The first 20 minutes cost you 20*.05 = $1, which leaves $4 to be spent on the $.10 minutes. With this $4, you can get 40 more minutes.
5. Critically evaluate the following statements and explain in what way they are true, false, or uncertain.

a. Sandy claims that she is indifferent between baking cookies and shopping. She also claims that she prefers baking cookies over watching TV. If Sandy claims that she is indifferent between shopping and watching TV, her preferences break the transitivity assumption. (Hint: transitivity guarantees that preferences make logical sense).

TRUE.

\[ \text{IF (baking cookies) I (shopping) AND (baking cookies) P (watching TV) THEN (shopping) I (watching TV) is NOT consistent with transitivity.} \]

She should have reported that (shopping) P (watching TV).

b. John consumes only running shoes and shorts. On the same day that his income is reduced by half, the prices of both running shoes and shorts fall by half. These events will shift John’s budget constraint in.

False. Let running shoes = \( X \) and shorts = \( Y \)

\[ Y = \frac{M}{P_Y} - \frac{P_X}{P_Y} X \]

Reduce everything by 1/2:

\[ \frac{1}{2} M - \frac{1}{2} \frac{P_X}{P_Y} X \], but all the \( \frac{1}{2} \)s cancel out and we are left with \( Y = \frac{M}{P_Y} - \frac{P_X}{P_Y} X \)

If you like numbers better...Suppose you initially have $100 and the price of running shoes is $1 and the price of cookie is $1 (keep it simple). The budget constraint is:

\[ Y = \frac{M}{P_Y} - \frac{P_X}{P_Y} X = \frac{100}{1} - \frac{1}{1} X = 100 - X \]

Halve everything:

\[ Y = \frac{50}{0.5} - \frac{0.5}{0.5} X = 100 - X \]
6. A recent report by the Census Bureau (http://www.census.gov/prod/2005pubs/p60-229.pdf) finds the following:
“The percentage of the nation’s population without health insurance coverage remained stable, at 15.7 percent in 2004. The number of people with health insurance increased by 2.0 million to 245.3 million between 2003 and 2004, and the number without such coverage rose by 800,000 to 45.8 million.” (see http://www.census.gov/Press-Release/www/releases/archives/income_wealth/005647.html for a summary)

You have been asked to evaluate a few proposals to increase the amount of health care that low income individuals receive.

a. Suppose the following is a typical budget constraint for a low-income individual. She spends all her money on health care and Y (everything else). If her income is $10,000, the price of Y is $10/unit (because the y-intercept is \( \frac{\text{income}}{P_Y} = 1000 \), we know income is $10,000, so \( P_Y \) must be $10/unit) and the price of health care is $20/unit (because the x-intercept is \( \frac{\text{income}}{P_{HC}} = 500 \), we know income is $10,000, so \( P_{HC} \) must be $20/unit) /unit.

b. Graph the effect of each proposal on the individual’s budget constraint and carefully label the budget constraint with the proposal letter.

Proposal A (BC_A): Pay half of each consumer’s health care bill. *For every $1 spent on health care, the government pays half, so the new price of health care is only $10/unit.*

Proposal B (BC_B): Give each individual $4000 in cash. *This causes a parallel shift in the BC.*

Proposal C (BC_C): Give each individual $4000 in a voucher that can only be used for health care. *This is like the food stamp example in class. The income cannot be used for Y, so the Y-intercept doesn’t change.*

c. Write equations for each of the budget constraints.

BC_A: \( Y = 1000 - HC \)

BC_B: \( Y = 1400 - 2HC \)

BC_C: If HC<200: \( Y = 1000 \) and if HC>200, \( Y = 1400 - 2HC \)
d. What type of person would prefer proposal A over proposal B and vice versa?
   A person who consumes lots of health care would prefer policy A because they can afford more
   health care. A person who consumes lots of Y, other goods, would prefer policy B, because it allows
   them to consume more Y.

e. Compare proposals B and C. Is one clearly better than the other? Why? Use your intuition!
   Policy B gives the person more options and therefore has the best chance of making the individual better
   off in terms of satisfaction. However, proposal C targets the money toward a good that is probably
   politically more popular.
Draw indifference curve maps for the following rankings of preferences and, where necessary, indicate the direction in which utility is increasing. (Hint: None of these look like the Oreo/Pizza one from class.

a. When Ruby goes to a garage sale, she finds 3 boxes of “stuff” for sale. The first box is filled with antique china birds and old books. A second box has the same number of china birds and even more old books. Ruby is equally excited about these two boxes. She is even more excited about a box with more china birds and the same number of old books as the first box.

b. Suppose Gene is a color blind consumer (that is, he can’t distinguish among different colors). Gene does not care what color sweatshirt he wears but gets more satisfaction the more sweatshirts he has.

c. Bea Student has wacky professor who tells her on the first day of class that she will be given two exams and that her grade in the course will be the maximum score of the two exams. That is, the lower of the two scores will be dropped. The higher Bea’s grade is, the happier she is.

d. Katie is a resident advisor in a dorm on campus. When asked if she would be on duty for additional hours, she replies, “Only in exchange for Ben and Jerry’s Ice Cream.”

d. What is Ruby’s MRS for books in terms of antique china birds? Zero. Ruby doesn’t care about books (they are a neutral good to her), so she is not willing to trade any of antique china birds in exchange for books, in order to stay just as happy.

e. What kinds of goods are blue and gray sweatshirts for Gene? Perfect substitutes in a 1:1 ratio.

f. Is Katie’s MRS diminishing? Explain. Katie’s MRS is diminishing BUT negative because RA Duty is a bad for her.
8. The diagram shows three (out of an infinite number) convex indifference curves for George Vanity.

a. Label the following points:
   - At Point Q, George consumes 50 tanning sessions and 50 units of Y.
   - At point R, George consumes 50 tanning sessions and 25 units of Y.
   - At point S, George consumes 25 tanning sessions and 50 units of Y.
   - At point T, George consumes 50 tanning sessions and 10 units of Y.
   - At point U, George consumes point 10 tanning sessions and 50 units of Y.

b. Given the typical assumptions about preferences made in class, of the labeled points, which point(s) gives the highest level of satisfaction?
   - Point Q is on the most NE indifference curve.

Point Q is on the most NE indifference curve.

c. Given the typical assumptions about preferences made in class, of the labeled points, which point(s) gives the lowest level of satisfaction?
   - Points U and T give an equal amount of satisfaction and the least satisfaction of any of the other labeled points.

Verbally explain what the marginal rate of substitution is. As George consumes more tanning sessions, what happens to his MRS? And why?

MRS is the benefit of one more Tanning session in terms of Y or George’s willingness to give up Y for one more Tanning Session.

The MRS is definitely diminishing. This is usually the case, because the more of one good that we have, the more we are willing to give up to get another unit of the other good (like at point S). The less of one good we have, the less we are willing to give up to get another one (like at point R). Our increase in satisfaction from one more good is low when we have a lot of something and our satisfaction in satisfaction from one more good is high when we don’t have much of that good.

d. True or false: At point T, George is consuming MORE tanning sessions than at point S. Because of our assumption more is better, George must prefer point T to point S. Fully defend your answer.
   - We assume that more is better, but that is holding everything else equal. While it is true that there is more tanning sessions at point T, there is much less Y at point T and this makes George worse off than at point S. Any point on an indifference curve to the northeast is a higher level of satisfaction than any point on an indifference curve to the southwest.

e. Label two more points. At point A, George consumes 35 tanning sessions and 90 units of Y. At point B, George consumes 55 tanning sessions and 35 units of Y. Explain why points A and B cannot be on the same indifference curve for George.
   - True. Indifference curves cannot cross for a single person because it breaks the assumption of transitivity.

f. Suppose Joanne has an indifference curve that runs through points A and B. What does the shape of her indifference curve tell you about how she feels about tanning sessions, relative to George?
   - Joanne’s MRS is higher than George’s (the slope of her indifference curve is steeper). That means she is willing to give up more Y to get an additional tanning session and stay just has happy. Joanne likes tanning sessions more than George.