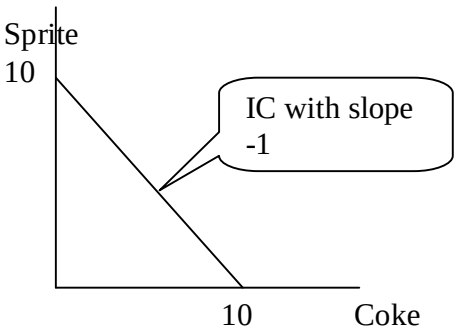
FE341: Microeconomics
Homework 2
Due September 15th
ANSWER KEY

1. a) $U(X,Y) = aX + Y$
   Indifference curves are downward-sloping straight lines. The slope of the IC is equal to the marginal rate of substitution is equal to -a.

   b) $U(X,Y) = X^{1/2} Y^{1/2}$
   The indifference curves have a "classic" convex shape. The marginal rate of substitution is equal to $-y/x$.

   c) $U(X,Y) = X^{1/2} + Y^{1/2}$
   The indifference curves have a convex shape. The marginal rate of substitution is equal to $-y^{1/2}/x^{1/2}$.

2. From the textbook page 103: Chapter 3 Questions for Review #4
   a) Jon's marginal rate of substitution can be defined as the number of cans of coke he would be willing to give up in exchange for a can of sprite. Since he is always willing to trade one for one, his MRS =1.
   b)



U(x,y)=x+y → perfect substitutes

   c) Jon's budget line and IC are both linear. Therefore, at no point will MRS = P_x/P_y and Jon will be at a **corner solution**. Specifically, if the slope of the BC is steeper than the slope of the IC he will choose to purchase good y (here Sprite) while if the slope of the BC is flatter than the slope of the IC he will choose to purchase good x (here Coke). If the slope of the BC is the same as the slope of the IC than he can purchase any combination of Sprite and Coke.

3. From the textbook page 104: Chapter 3 Questions for Review #11
Bill **should not make the trade**. If he gives up the 4 movie tickets he will save $32 total ($8 per ticket). However, this is not enough for a basketball ticket. He would have to be willing to trade 5 movie tickets for 1 ticket to a basketball game in order to make the trade.

You could also approach this problem by equating MRS to the slope of the IC (or from FE210 "consumer equilibrium" where MU/P are equal across all goods): For example:

the $MRS = \frac{MU_{ball}}{MU_{movie}} = -\frac{4}{1} \neq \frac{40}{8} = \frac{P_{ball}}{P_{movie}} = slopeBC$ equivalently

$\frac{MU_{ball}}{P_{ball}} = \frac{4}{40} = \frac{1}{10} < \frac{MU_{movie}}{P_{movie}} = \frac{1}{8}$ Because the MU per dollar is higher for movie tickets, Bill would receive higher utility from consuming more movie tickets and fewer basketball tickets.

4. From the textbook page 105: Chapter 3 Exercises #11

The marginal rate of substitution of peaches for avocados is the amount of avocados that a person is willing to give up to obtain one additional peach. When consumers maximize utility, they set their marginal rate of substitution equal to the price ratio, $\frac{P_{peach}}{P_{avocado}}$. In Georgia, $P_{avocado} = 2P_{peach}$, to maximize utility this implies that MRS = $\frac{P_{peach}}{P_{avocado}}$ = ½. In California, $P_{avocado} = P_{peach}$, to maximize utility this implies that MRS = $\frac{P_{peach}}{P_{avocado}}$ = 1.

Therefore, the MRS is higher in California.

5. From the textbook page 105: Chapter 3 Exercises #16
   a) Utility is maximized the slope of the BC is equal to the slope of the IC. This occurs when $MRS_{FC} = P_F/P_C$. Given that food is on the horizontal axis and clothing is on the vertical axis, the slope of the BC is $\frac{P_F}{P_C} = \frac{2}{5} = -\frac{1}{5}$. So the MRS_{FC} is -1/5 (note, all BC and normal good IC have negative slopes).

   b. We want to Max $U(F,C) = FC$ Subject to the budget constraint

   Step 1: Find the BC $P_F F + P_C C = I$
   à $2F + 10C = 50$
   Step 2: Solve BC for F or C à $F = 25 - 5C$
   Step 3: Substitute this into Utility à $U = (25 - 5C)C$ à $25C - 5C^2$
   Step 4: Find the derivative of utility with respect to C ($\frac{dU}{dC}$) and set equal to 0

   $$\frac{dU}{dC} = 25 - 10C = 0$$

   Step 5: Now solve for C: C = 2.5
   Step 6: Substitute P into the BC to find F: F = 25 - 5(2.5), F = 12.5

   Double checking that $MRS_{fc} = -5 = P_c/P_f$ = slope of the BC

   $MRS_{FC} = \frac{MU_F}{MU_C} = \frac{C}{F} = \frac{2.5}{12.5} = \frac{1}{5}$.

6. From the textbook page 141: Chapter 4 Questions for Review #8
   a) Salt : small income effect, small substitution effect. The amount of income spent on salt is relatively small, but since there are few substitutes for salt, consumers will not readily substitute away from it. As the price of salt rises, real income will only fall slightly, thus leading to a small decline in consumption.

b) Housing : large income effect, no substitution effect. The amount of income spent on housing is relatively large for most consumers. If the price of housing were to rise, real income would be reduced substantially, thereby reducing the consumption of all other goods. However, consumers would find it impossible to substitute for housing, in general.

c) Theater tickets : small income effect, large substitution effect. The amount of income that is spend on theater tickets is relatively small, but consumers can substitute away from theater tickets by choosing other forms of entertainment. As the price of theater tickets rises, real income will only fall slightly, but the substitution effect can be large enough to reduce consumption by a large amount.

d) Food : large income effect, no substitution effect. The amount of income spent on food is relatively large for most consumers. Price increases for food will reduce real income substantially, thereby reducing the consumption of all other goods. Although consumers can substitute out of a particular food, they cannot substitute out of food in general.