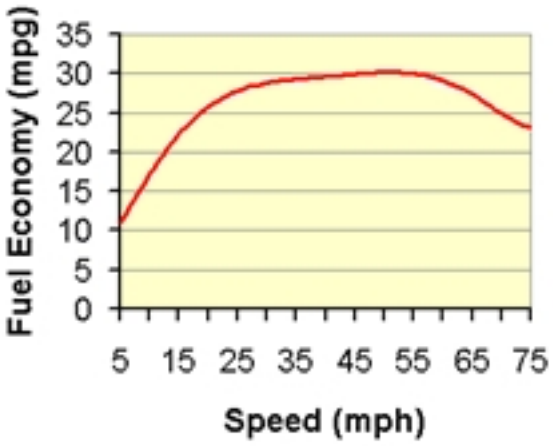
Math 10: The Art and Practice of Mathematics
Assignment 4
Due Wed Mar 12

Your solutions should be written so-as to be clear to an audience of fellow math 10 students.

1. The gas mileage as a function of speed for a 2006 BMW 325 is given by the graph below.



   (a) What is the gas mileage at 15 mph?

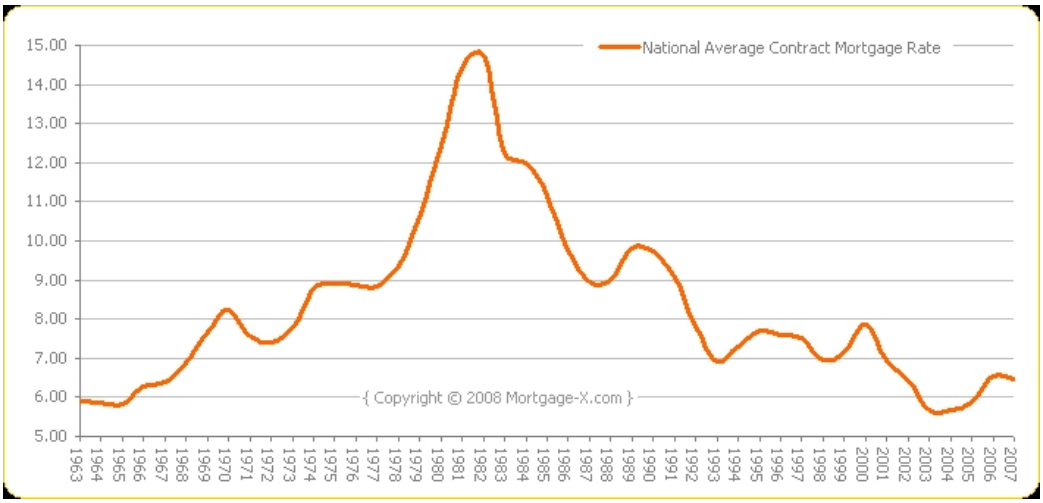
   (b) What is the gas mileage at 70 mph?

   (c) At what speeds does the BMW get gas mileage of 25 mpg?

   (d) At what speed does the BMW get the best gas mileage?

   (e) Gas mileage is usually broken down further into *city mileage* and the *highway mileage*. Give a rough estimate of the city and highway mileage of the 2006 BMW 325. Explain how you arrived at your estimates.

2. The national average mortgage interest rate as a function of time is given by the graph below.



(a) What was the rate in 2000?

(b) What was the rate in 1990?

(c) In which years was the rate 8%?

(d) In which year was the rate the highest?

(e) In which year was the rate the lowest?

3. For each of the game tables in Chapter 4 problems #2 and #3,

(a) Determine the row and column maximin strategies.

(b) Check if the row and column maximin strategies you found in part (a) form a Nash equilibrium.

(c) Is the game purely competitive? Why or why not?

(d) Is the result you found in part (b) consistent with the theorem that states that, for a purely competitive 2-player game, any Nash equilibrium is given by a maximin row and column strategy.

4. Graph the following equations.

   (a) $y = x + 5$

   (b) $y = 2x - 4$

   (c) $y = 10 - 3x$

   (d) $x = 3y + 1$

   (e) $x = \frac{1}{2}y + 2$

   (f) $2x + 3y = 60$

5. Determine the (x, y)-coordinates where the lines determined by each pair of equations cross.

   (a) $y = 3x - 2, y = \frac{x}{5} - \frac{7}{5}$

   (b) $y = 2x + 5, y = \frac{x}{7} - \frac{3}{7}$

   (c) $y = 3x - 2, x = 5y + 7$

   (d) $y = 2x + 5, x = 7y + 3$