Algebra
Homework Three
Sections 2.3 and 2.4

January 31, 2015

1 Sections 2.3 and 2.4

- Section 2.3: 15–17, 30, 31, 43
- Section 2.4: 1, 5, 24, 28, 32, 35, 36, 52, 54, 57

2 Additional Problems

1. It would be a shame to let Super Bowl week go by without a prediction. Here's my prediction.

   At half time the Colts will have scored as many field goals as the Saints have scored touchdowns. In the second half, the Colts will score three touchdowns while holding the Saints to 9 points. The Colts will win the game by one point by making a two point conversion after the final touchdown as time expires. Of course, since this is the Super Bowl, nobody misses extra points or gets safeties, and the only two point conversion will be the one I mentioned.

   If my prediction comes true, what will the final score be?

2. A judge in Pennsylvania was having trouble paying his bills with his meager judicial salary. So when a prison moved into town, he saw a golden business opportunity. He worked out a deal with the prison where, for a small fee, he would sentence juveniles to lengthy prison terms. If a particular offense was usually punished with a fine, he would instead issue the maximum punishment so the defendant would enjoy some time in the new prison.

   It was a terrific arrangement for everyone. Even with the rising prices of yachts, the judge was able to make ends meet. The prison had plenty of residents. And since they charged the state for each prisoner, the prison owners were thrilled. The modest investment in bribes paid off handsomely.

   (a) The judge wanted to make $1,300,000 from the scheme. He decided a reasonable plan would be to charge an initial down payment for his participation, and then a fee for each sentence handed out. If the initial down payment was $200,000, and he charged a bribe of $2,000 per case, how many cases would he need to process to reach his goal?

   (b) Judging is hard work, even when you've already decided the outcome in advance. So the judge decided to retire a bit early. He still wanted to make $1,300,000 from the scheme, but he wanted to retire after only taking in $1,000,000, investing his money to make up the difference.

He found a bank that paid 5% simple interest ($i = Prt$) per year. Assuming he can manage to survive without spending any of the principal or interest, how long will he have to wait for his \$1,000,000 to turn into \$1,300,000?

3. The equation for a Celsius temperature in terms of a Fahrenheit temperature is:

$$C = \frac{5}{9}(F - 32)$$

   (a) What is the equation for a Fahrenheit temperature in terms of a Celsius temperature?

   (b) There is one temperature where the temperature in Celsius is the same as the temperature in Fahrenheit. In other words: x degrees Fahrenheit = x degrees Celsius.

   What is this temperature?

4. Two police cars depart from the same point, traveling in opposite directions towards different donut shops. One car travels 6 mph faster than the other car. Find the speed of each car if they are 176 miles apart at the end of 55 minutes.

5. Last week I was chatting with one of the UBB English professors. She asked me if I'd heard the poem by Robert Browning which begins: *"A rose-red city, half as old as time..."*

   "Wait!" I interrupted, "That would make a good algebra problem." I thought about it for a minute or two and came up with this poem:

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   A rose-red city, half as old as Time.
   One billion years ago, the city's age
   Was just two-fifths of what Time's age will be
   A billion years from now.  Can you compute
   How old the crimson city is today?
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   She gave me a funny look and quickly changed the subject. How old is the rose-red city?

3   Extra Credit

A commuter is in the habit of arriving at his suburban station each evening exactly at 5:00. His wife always meets the train and drives him home. One day he takes an earlier train, arriving at the station at 4:00. The weather is pleasant, so instead of telephoning home he starts walking along the route always taken by his wife. They meet somewhere along the way. He gets into the car and they drive home, arriving at their house ten minutes earlier than usual.

Assuming that the wife always drives at a constant speed, and that on this occasion she left just in time to meet the 5:00 train, how long did the husband walk before he was picked up?