**MA 15200 Lesson 16 Appendix E and Appendix F**

This lesson continues with applied problems with quadratic equations.

## I Uniform motion problems

***Always let *x* represent an unknown question of the problem.**
**You will need a calculator to approximate some homework problems of this lesson.**
**Always factor out a GCF before choosing your method to solve the equation.**

Ex 1: A boat travels 8 miles upstream and 10 miles downstream in a total time of 12 hours. The speed of the stream is 1 mile per hour. Approximate the speed of the boat in still water rounded to the nearest hundredth.

| | Distance | Rate | Time |
|---|---|---|---|
| upstream | | | |
| downstream | | | |

Ex 2: Larry paddled his canoe 18 miles on the first part of a trip at a certain speed. He continued another 16 miles, traveling at a speed 2 miles per hour slower than the first part of the trip. The total time for the trip was 7 hours. Find his speed on each part of the trip.

| | Distance | Rate | Time |
|---|---|---|---|
| $1^{st}$ part of the trip | | | |
| $2^{nd}$ part of the trip | | | |

## II Job or Work Problems

Remember the format for these problems: rate(time) + rate(time) = 1 job

Ex 3: A janitorial service provides two people to clean an office building. Working together, the two can clean the building in five hours. One person, new to the job, would take 2 hours longer than the employee would take who has been there longer, if he cleaned the building alone. How long would it take the less experienced worker to clean the building alone? Round to the nearest tenth of an hour.

Let $x$ = time for the more experienced worker
$x + 2$ = time for the less experienced worker

Ex 4: Bob can wax his car in 2 hours. When he works together with Jim, they can wax the car in 20 minutes. How long would it take Jim by himself to wax the car?

***Note: On a homework problem similar to this one, a suggestion is made to convert all time units to minutes. If you do that, the final answer should be converted back to hours.**

## III Pythagorean Theorem problems

Ex 5: Two cars left the same parking lot at the same time, one traveling due north and the other due east. After a period of time, they were 100 miles apart and the north-bound car had traveled 20 more miles than the east-bound car. How far had each car traveled from the parking lot?

Ex 6: A small garden plot of land is in the shape of a right triangle with the larger leg 7 feet longer than the shorter leg and the hypotenuse 8 feet longer than the shorter leg. Find the lengths of all three sides.

## IV Projectile Problems

Ex 7: A ball is tossed vertically upward from the ground. Its distance in feet from the ground is given by $s = -16t^2 + 48t$. After how many seconds will the ball be 32 feet above the ground?