Worksheet #10 Answers, September 30, 2015
Math 221 Lecture EL1

Instructions. Put your first and last name at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to show your work and explain your reasoning. All worksheets from each group will be collected.

1. If a snowball melts so that its surface area decreases at a rate of 1 cm\(^2\)/minute, find the rate at which the diameter decreases when the diameter is 10 cm.

   Answer: \(\frac{1}{20\pi}\) cm/minute.

2. A flat raft is pulled into a dock by a rope attached to a loop on the edge of the raft and passing through a pulley on the dock that is one meter higher than the raft. If the rope is pulled at a rate of 1 meter/second, how fast is the raft approaching the dock when it is 8 meters from the dock? Use the correct units in your answer...

   ![Diagram of raft and dock]

   Answer: \(\frac{\sqrt{65}}{8}\) \(\approx 1.01\) meters/second.

3. A trough is 10 feet long with a rectangular surface, but a cross-section of the trough looks like an isosceles triangle (a triangle with two sides of equal length...). The width of the surface of the trough is 3 feet, and the depth of the trough is 1 foot. If the trough is being filled with water at a rate of 12 ft\(^3\)/minute, how fast is the water rising when the water is 6 inches deep? Use the correct units in your answer...

   Answer: \(\frac{4}{5}\) feet/minute.
4. A particle is moving along the hyperbola defined by the equation $xy = 8$, where the units on the $x$- and $y$-axes are labeled in centimeters. As it reaches the point $(4, 2)$, the $y$-coordinate is decreasing at a rate of 3 cm/second. How fast is the $x$-coordinate of the point changing at that instant? Is it increasing or decreasing?

Answer: The $x$-coordinate is increasing at a rate of 6 cm/second.