

## Workshop on the Transition from High School to College

*Problems from Pre-calculus Supplemental Instruction Course (196L), Fall 2011*

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*PS 4, #3*

Suppose the rate at which a rumor is spread in a town with a population of 1000 people is (jointly) proportional to the product of the number of people who have heard the rumor and the number of people who have not heard the rumor. Assume that the constant of proportionality is positive.

- Write an equation for the rate as a function of the number of people who have heard the rumor.
- What is the rate of spread when the entire town has heard the rumor?
- How many people have heard the rumor at the instant when the rate of spread is at its maximum?

*PS 8, #3*

The following statements about  $f(x)$  are true:

- $f(x)$  is a polynomial function
- $f(x) = 0$  at exactly four different values of  $x$
- $f(x) \rightarrow -\infty$  as  $x \rightarrow \pm\infty$

For each of the following statements decide if the statement is always true, never true or sometimes true. For always true and never true, justify your answer. If sometimes true give an example of both.

- $f(x)$  is an odd function.
- $f(x)$  is an even function.
- $f(x)$  is a fourth degree polynomial.
- $f(x)$  is a fifth degree polynomial.
- $f(-x) \rightarrow -\infty$  as  $x \rightarrow \pm\infty$ .
- $f(x)$  is a 1-1 function.
- The lead coefficient is  $-0.001$ .

*PS 9, #2*

Salt water of concentration 0.1 pound of salt per gallon flows into a large tank that initially contains 50 gallons of pure water. The flow of salt water into the tank is 5 gal/min.

- Find a formula for the salt concentration after  $t$  minutes.
- Discuss the two asymptotes for the salt concentration function and how they relate to the story problem.

*PS 1, #1*

Consider a stack of three tennis balls.

- Is the height of the stack less or greater than the circumference of one tennis ball?
- Now answer the same question with ping-pong balls. Is the answer the same or different?
- Now make a statement or two and support it for any 3 spherical shapes that are stacked.