

## In-Class Assignment 2

MATH 139-02  
Monday, February 9, 2004

**Directions:** Work neatly on a separate sheet of paper. Your group will hand in one write-up with everyone's name on it. **DO NOT** fold the corner over to hold everything together!

Work together on each problem; do not delegate different problems to different people.

- What is 5% of 38,462?
  - What is 5% of  $x$ ?
  - What is 5% more than  $x$ ?
  - What is 5% less than  $x$ ?
  - What is 5% of your answer in (c)?
  - What is 5% more than your answer in (c)?
  - What is 5% of your answer in (d)?
  - What is 5% less than your answer in (d)?
  - What is 10% more than  $x$ ?
  - What is 10% less than  $x$ ?
  - What do you observe? Does this remind you of anything?
- Graph the function  $f(x) = \left(1 + \frac{1}{x}\right)^x$ .
  - Set your calculator window to include  $x = 0$  and  $x = 1$  billion. Graph the function again.
  - Using the TRACE function on your calculator, determine  $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$ .
  - Compute  $f(x)$  for  $x = 10, 1,000,000, 1,000,000,000,000,000,000$ , and  $100,000,000,000,000,000$ . Explain what you observe.
  - Set your window to include  $100,000,000,000,000,000$ . Explain what you observe.
- Use your calculator to determine  $\lim_{x \rightarrow 0} (1+x)^{1/x}$ . You will need to discuss with your group how to interpret the symbol  $\lim_{x \rightarrow 0}$  and how to set your window to obtain a meaningful value.
- A radioactive substance decays by 5% in 12 hours. How long does it take to decay by 10% (total)?
- We know how to compare exponential functions and polynomials from class. Where does the function  $f(x) = x^x$  fit into this hierarchy?