

## In-Class Assignment 4

MATH 141  
Friday, September 30, 2011

**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.

Let  $f(x) = a^x$ ,  $g(x) = b^x$ , and  $k(x) = c^x$ . I will give each group values of  $a$ ,  $b$ , and  $c$  to use.

1. For  $f$ ,  $g$ , and  $k$ , apply the definition of the derivative and factor out  $a^x$ ,  $b^x$ , and  $c^x$ , respectively.
2. Using  $h = 0.1, 0.01, 0.001$ , and  $0.0001$ , find approximate values for  $\lim_{h \rightarrow 0} \frac{a^h - 1}{h}$ ,  $\lim_{h \rightarrow 0} \frac{b^h - 1}{h}$ , and  $\lim_{h \rightarrow 0} \frac{c^h - 1}{h}$ .
3. Report your results to me!
4. Based on our work, what is the derivative of  $a^x$ ?