3-1 EXAMPLES

1. True or False: $a^{p+q} = a^p a^q$

2. Use your calculator to evaluate the limit below:

$$\lim_{h \to 0} \frac{e^h - 1}{h}$$

3. Use the h *definition of the derivative* to find the derivative of $f(x) = e^x$. (Hint: Use problems 1 and 2 above.)

4. Explain why the derivative should pass through sums and differences *based on your knowledge of limits and the definition of the derivative*.

   That is: Give a rationale for the rule

$$\frac{d}{dx}\left[f(x) + g(x)\right] = \frac{d}{dx}[f(x)] + \frac{d}{dx}[g(x)].$$

5. Find the derivatives of the functions below *using the rules discussed in class today.* (Chain rule, quotient rule, product rule not needed!)

   (a) $f(x) = 6.1x^3 + \pi x + e^2 + 4e^x$

   (b) $f(x) = \frac{8}{x^4} - \frac{x^2}{7} + \frac{\sqrt{5}}{2}$

   (c) $y = 6x^{5/3} - x^{1/3}$

   (d) $y = \frac{x^2+5\sqrt{x}+1}{\sqrt{x}}$

   (e) $y = x(x+1)$

   (f) $y = ax^2 + \frac{b}{x} + c$