ESP Math 179 **Fall 2015**

Worksheet 8

17 September 2015

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1. **Warm up:** Answer these questions with "True" or "False".

   (a) If a line is tangent to a graph at a point, it only touces the graph at that point.

   (b) The exponential function e^x has two different points with equal tangent lines.

   (c) Given any line, there is always a function with that line as a tangent line at $x = 0$.

2. Evaluate derivatives of the following functions, with respect to x.

   (a) x^5
   (b) $x^{5/2}$
   (c) $x^{5/2}/x^{3/2}$
   (d) x^{-5}
   (e) $x^5 + x^{-5}$
   (f) $2x^5$
   (g) $(2x^5) \cdot (3x^{5/2})$
   (h) $-2(x^5 + 3x^{-5/2})$
   (i) $2 \cdot \dfrac{x^{-3/2} - x^5}{5x}$
   (j) e^x
   (k) e^{5x}
   (l) $e^{5x}e^{5x/2}$
   (m) 5^x
   (n) $e^{5x}/5^{ex}$

3. Evaluate the following derivatives, for $n = 1, 2, 3, \ldots$ in part (e).

   (a) $\dfrac{d}{dy}(y)$ (b) $\dfrac{d^2}{dy^2}(y^2)$ (c) $\dfrac{d^3}{dy^3}(y^3)$ (d) $\dfrac{d^4}{dy^4}(y^4)$ (e) $\dfrac{d^n}{dy^n}(y^n)$

4. Consider the function e^x and a point a on the x-axis.

   (a) Find the equation of the tangent line, in the form $y = mx + b$, of e^x at $x = a$.
   (b) Find $\lim_{a \to -\infty}[m]$.

5. Using the limit definition of the derivative, show that the derivative of a sum of two functions is the sum of the derivatives of the two functions.

6. Think of the topic in Math 180 at which you feel weakest.

   (a) Write down a question in this topic that you could not answer.
   (b) Write down a question in this topic that you could answer.