ESP Math 182 **Spring 2017**

Worksheet 1

10 January 2017

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1. What are the names of the members of your group?

2. Recall the following differentiation rules with your group and write down the formulas. Then, come up with a function that would require the rule to differentiate it, and finally, differentiate that function.

   (a) Power rule

   (b) Exponential rule

   (c) Product rule

   (d) Quotient rule

   (e) Chain rule

3. Differentiate the folllowing functions with respect to the appropriate variable. Let c be some fixed constant.

   (a) $f(x) = x\cos(x^2)$

   (b) $F(x) = \frac{x^3}{9}(3\ln(x) - 1)$

   (c) $\varphi(w) = e^{3w}/\ln(w)$

   (d) $h(v) = \sum_{k=1}^{1726} v^k$

   (e) $g(y) = ye^{\sqrt{y}}$

   (f) $H(z) = \arcsin(3z + 1)$

   (g) $\psi(x) = x^c + c^x$

   (h) $M(s) = \dfrac{c^2 - s^2}{\sqrt{c^2 + s^2}}$

4. Recall the fundamental theorem of calculus (FTC).

   (a) What is the statement of the theorem?

   (b) Using the FTC, find
   $$\frac{d}{dx}\int_0^x \sin(e^{t^2})\ dt.$$

   (c) Let f be continuous everywhere. Using the FTC, find
   $$\frac{d}{dx}\int_{a(x)}^{b(x)} f(t)\ dt.$$

5. Find all critical points for $f(x) = x - \ln x$. Then find the global minimum and maximum on the interval $0.1 \leq x \leq 2$.

6. Share with your group: What is your current major of study, what you would like to achieve in ESP, and what do you see yourself doing after college? What you think is most important about a college education? Write down your favorite response.