Math 1300-005 - Spring 2017
Chain Rule Activity, Part I - 2/22/17

Guidelines: Please work in groups of two or three. This will not be handed in, but is a study resource for the next midterm.

Recall **the chain rule**, which states

$$\frac{d}{dx}q\big(r(x)\big) = q'\big(r(x)\big)\frac{d}{dx}r(x)$$

1. Use the chain rule to differentiate the following.

   (a) $f(x) = \sqrt{1 + \cos(x)}$

   (b) $g(x) = e^{(x^2 - \cot(x))}$

   (c) $h(x) = \sec(2x^3 - 9x^2 + 4)$

   (d) $\ell(x) = \sin(2^x - \tan(x))$

2. It often happens that you have to do the chain rule within the product and quotient rules. Keep this in mind to differentiate the following.

   (a) $F(x) = (2x - 5)^4(8x^2 - 3x)^{-3}$

   (b) $G(x) = \dfrac{x}{\sqrt{x^2 + 1}}$

3. As well, it often happens that you must do the product or quotient rule within the chain rule. Differentiate the following.

(a) $H(x) = \left(\dfrac{1+x^2}{2-x^4}\right)^{-1/3}$

(b) $L(x) = e^{(x^2 \csc(x))}$

4. Finally, it is possible that multiple iterations of the chain rule will be necessary. Differentiate the following.

(a) $m(x) = \sin(\cos(\tan(x)))$

(b) $b(x) = \sqrt{x + e^{\cos(x)}}$