Instructions: This activity is about learning things, so don’t waste your time doing problems that are easy for you! In groups of two or three, pick problems that you’re not sure how to do. When you’re done with each problem, talk to me about putting your answer up on the board. Also, feel free to ask me for help!

1) (fall 2014 prelim 1) (TRUE / FALSE) Any function that has an inverse must be either increasing or decreasing.

2) (§1.5) Find the natural domain and the range of \( f(x) = \frac{3}{1-e^{2x}} \)

3) (§1.6) Suppose that \( \ln(y^2 - 1) - \ln(y + 1) = \ln \sin x \). Solve for \( y \) in terms of \( x \).

4) (fall 2014 prelim 1) Evaluate the limit: \( \lim_{x \to 1} \sin \left[ \frac{(x-5/6)\pi}{x-1} \right] \cos \left( \frac{x^2-1}{x-1} \right) \)

5) (§2.4) \( \lim_{x \to 0} \frac{x - x \cos x}{\sin^2 3x} \)

6) (§2.4) \( \lim_{h \to 0} \frac{\sin(\sin h)}{\sin h} \)

7) (§2.4) Suppose that \( f \) is odd. Does knowing that \( \lim_{x \to 0^-} f(x) = 3 \) tell you anything about \( \lim_{x \to 0^+} f(x) \)? Explain your answer.

8) (§2.5) Where is \( f \) continuous? \( f(x) = \frac{\sqrt{x^4 + 1}}{1 + \sin^2 x} \)

9) (§2.5) Is \( \sin \left( \frac{\pi}{2} \cos(\tan t) \right) \) continuous at \( t = 0 \)?

10) (§2.5) Explain why \( \cos x = x \) has at least one solution.

11) (§2.6) Find all asymptotes of \( y = \frac{-2x^3 - 5x + 2}{x^2 - 1} \).

12) (§3.2) Differentiate \( y = \frac{8}{\sqrt{x-2}} \) and find the equation of the tangent line at \( x = 6 \).

13) (fall 2014 prelim 1) Let \( g \) be a continuous function on \([0, 1]\) with \( g(0) = g(1) = 1 \). Explain why there must be at least one point \( c \) in \((0, 1)\) with \( g(c) = 2c \).