Math 1500 Distance Assignment 1 Due May 22.

This HW covers Sections 1.1 to 2.2. It is important that you only upload your assignment ONCE.

1. Find the domain of the following functions:

$$f(x) = \frac{x^2}{x^2 - 5x + 4}, \qquad g(x) = \begin{cases} \frac{x^3 - x}{\sqrt{x-4}}, & x < 5; \\ 100, & x \geq 10. \end{cases}$$

2. Sketch a graph of the following functions:

$$f(x) = \begin{cases} x^2, & x \geq 0; \\ -x^2, & x < 0. \end{cases} \qquad g(x) = |2x^2 - x - 15|.$$

   Specify whether each function is even, odd, or neither. Write down the intervals in which each function is increasing.

3. Sketch the following graphs:

$$f_1(x) = \sin x, \qquad f_2(x) = \sin(x - \pi/2), \qquad f_3(x) = \sin(x - \pi/2) + 3$$

   and

$$g_1(x) = e^x, \qquad g_2(x) = e^{x-2}, \qquad g_3(x) = e^{x-2} + 3.$$

4. Graph the ellipse $(x-1)^2 + 9(y-2)^2 = 1$. Use the vertical line test to see if the curve is the graph of a function.

5. Let $f(x) = \sin x$ and $g(x) = \log_2 x$. Write out $f \circ g$ and $g \circ f$ and the domains of these compositions.

6. Solve the following equations for x:

$$i)\ \log_2(x + 3) - \log_4(x + 3) = 2; \qquad ii)\ 3^{x^2} = 9^{4x}.$$

7. Let $f(x) = \ln(2 + x^3)$. Find $f^{-1}(y)$. Write down the domains of f and f^{-1}.

8. Simplify the expression $\sin(\cos^{-1} x)$, $x \in (-1, 1)$.

9. Given that $\lim_{x \to 0} \frac{\sin x}{x} = 1$. Evaluate $\lim_{x \to 0} \frac{\sin \pi x}{x}$.

10. Given the graph of f below. Determine $\lim_{x \to -\infty} f(x)$, $\lim_{x \to 0_-} f(x)$, $\lim_{x \to 0_+} f(x)$, $\lim_{x \to 0} f(x)$, $\lim_{x \to 1_-} f(x)$, $\lim_{x \to 1_+} f(x)$, $\lim_{x \to 1} f(x)$, $\lim_{x \to 2} f(x)$, $\lim_{x \to 3_-} f(x)$, $\lim_{x \to 3_+} f(x)$, $\lim_{x \to 3} f(x)$, $\lim_{x \to \infty} f(x)$.