Exam 1 Review: Worksheet 1

1. Find the average rate of change of the function

$$f(t) = 5 + \cos(t)$$

over the interval $[0, \pi/4]$.

2. For each of the functions below, find the vertical asymptotes AND the domain of continuity:

a). $f(x) = \dfrac{3x - 12}{x^2 - 7x + 6}$

b). $f(x) = \dfrac{x}{x^2 + 1}$

c). $f(x) = \dfrac{3x - 6}{x^2 - 6x + 8}$

3. Find the limit, if it exists:

$$\lim_{x \to 2} \frac{1}{x - 2} + \frac{1}{|x - 2|}.$$

4. Find the limit, and justify your answers:

$$\lim_{x \to 2} (x - 2) \cos\left(\frac{1}{x - 2}\right).$$

5. The length of a rectangle is increasing at a rate of 8cm/s, and its width is increasing at a rate of 3cm/s. How fast is the area increasing when the length is 20cm and the width is 10cm?

6. For what values of c is the function below continuous?

$$f(x) = \begin{cases} x^2 - 8, & \text{if } x \leq c \\ 10x - 33, & \text{if} x > c. \end{cases}$$

7. Given the relationship below:

$$M = \frac{a^2 \sqrt{b}\, p^{-1/4}}{z^7},$$

find each of the following:

$$\frac{dM}{da}; \quad \frac{dM}{db}; \quad \frac{dM}{dp}; \quad \frac{dM}{dz}$$