

## QUIZ 2

Please show ALL of your work to receive full credit on each problem.

**Problem 1.** (14 points)

(a) (6 pts) Express the function

$$f(x) = \frac{8 - 2x}{|4 - x|}$$

as a piecewise function. Split the domain into two parts: when  $x \leq 4$  and when  $x > 4$ .

(b) (8 pts) Evaluate the following limit, if it exists. **If it does not exist, please explain why.**

$$\lim_{x \rightarrow 4} \frac{8 - 2x}{|4 - x|}.$$

**Problem 2.** (12 points) Consider the function

$$g(x) = \cos(x) - (x - 1)^2.$$

(a) (6 pts) Explain, citing theorems/facts why  $g$  is continuous on the interval  $[1, 3]$ .

(b) (6 pts) Use the Intermediate Value Theorem (IVT) to show that there is a solution of the equation

$$\cos(x) = (x - 1)^2$$

in the interval  $(1, 2)$ .

**HINT:** You need to use (a) in order to apply the IVT. Also note that  $\cos(1) \approx 0.54030$  and  $\cos(3) \approx -0.98999$ .

**Problem 3.** (10 points) Find all of the horizontal asymptotes of the following functions

(a) (5 pts)  $h(x) = \frac{4x^3 - 2x + 1}{2x^3 + x^2 + 5x - 1}$ .

(b) (5 pts)  $r(x) = \frac{4x^3 - 2x + 1}{2x^4 + x^2 + 5x - 1}$ .

**Problem 4.** (14 points)

(a) (4 pts) State the limit definition of the slope of a tangent line to the curve of a function  $f$  at a point  $(a, f(a))$ . You may state either one of the definitions shown in class.

(b) (8 pts) Find an equation of the tangent line to the curve of the function

$$f(x) = \frac{1}{x}$$

at the point  $(1/2, 2)$ .