

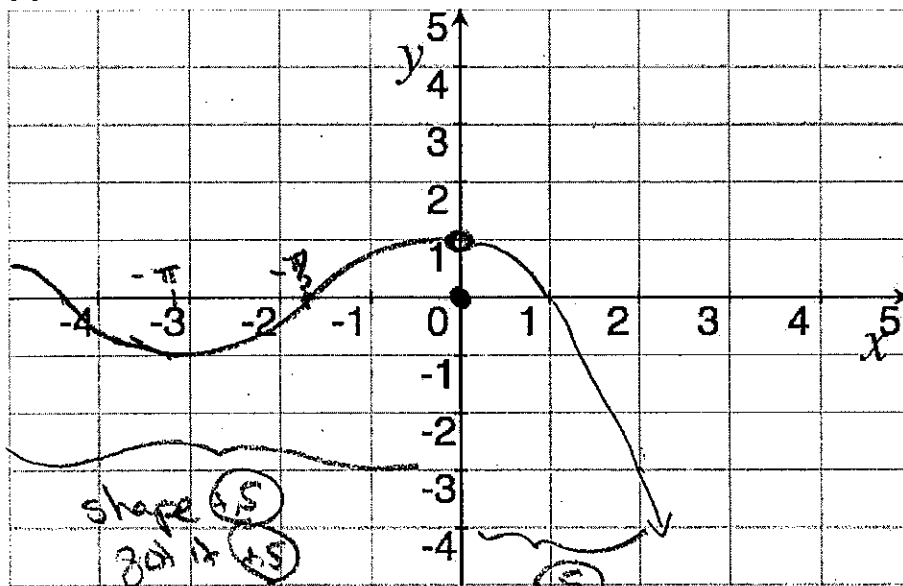
TMATH 124pm: Quiz 2

Key

Show *all* your work (numerically, algebraically, or geometrically) for each and simplify. No credit is given without supporting work.

1. (§2.5 #21) Let $f(x) = \begin{cases} \cos(x) & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 1 - x^2 & \text{if } 0 < x \end{cases}$ parabola, vert flip + shifted up one.

(a) [2] Carefully graph f on the axis provided



(b) [1] Explain why f is discontinuous at 0.

$$\lim_{x \rightarrow 0} f(x) \neq f(0)$$

$$1 \neq 0$$

2. [2] (WebHW4 #3) Suppose f and g are continuous functions such that $g(5) = 4$, $\lim_{x \rightarrow 5} [3f(x) + f(x)g(x)] = 21$. Find $f(5)$.

$$\lim_{x \rightarrow 5} [3f(x) + f(x)g(x)] = 21$$

$$\Rightarrow \text{by limit laws } (+.5) \quad 3 \lim_{x \rightarrow 5} f(x) + \lim_{x \rightarrow 5} f(x) \lim_{x \rightarrow 5} g(x) = 21$$

$$\text{b/c } g \text{ is cont } \quad \lim_{x \rightarrow 5} g(x) = g(5) = 4 \quad (+.5)$$

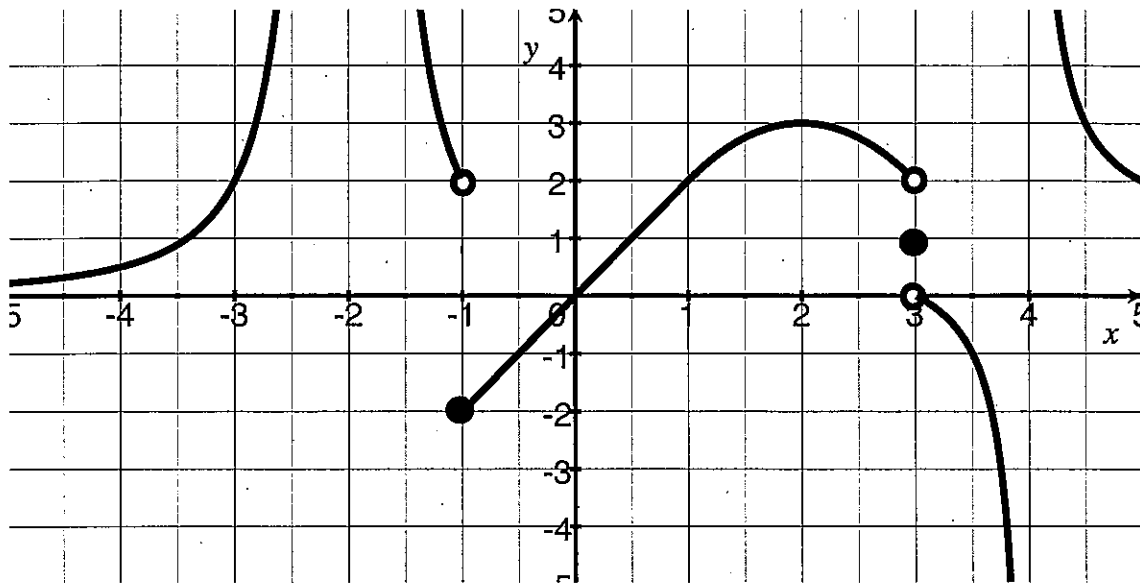
$$\Rightarrow 3 \lim_{x \rightarrow 5} f(x) + [\lim_{x \rightarrow 5} f(x)] \cdot 4 = 21$$

$$\lim_{x \rightarrow 5} f(x) = \frac{21}{7} = 3$$

$$\lim_{x \rightarrow 5} f(x) = 3 \quad \text{alg } (+.5)$$

notation (+.5)

3. The graph of a function R is given below:



(a) [3] (Con't wks) State the numbers at which R is discontinuous.

not continuous when

$$x = 4, 3, -1, -2$$

got one (+1)
 got 2 (+1)
 got all (+1)

(b) [2] (§2.3 #2) Evaluate $\lim_{x \rightarrow 1} [2R(x) - 3]$

$$\lim_{x \rightarrow 1} [2R(x) - 3] = \lim_{x \rightarrow 1} 2R(x) - \lim_{x \rightarrow 1} 3 \quad \text{law \#3}$$

$$= 2 \lim_{x \rightarrow 1} R(x) - \lim_{x \rightarrow 1} 3 \quad \text{by law \#3}$$

$$= 2 \cdot 2 - \lim_{x \rightarrow 1} 3 \quad \text{by def of limit.}$$

$$= 4 - 3$$

$$= 1 \quad \text{got (+5)}$$

definition (+5)
 limit law (+5)