MATH 1910 QUIZ 1

20 points

NAME:____________________________

10 pts 1. Let $f(x) = \dfrac{x^2-5x+6}{x^2-x-6}$.

(a) The function f has a removable discontinuity at $x=3$. Compute $\lim\limits_{x\longrightarrow 3} f(x)$. You must show your work and use proper limit notation for full credit.

$$\lim_{x\longrightarrow 3} \frac{x^2-5x+6}{x^2-x-6} = \lim_{x\longrightarrow 3} \frac{(x-3)(x-2)}{(x-3)(x+2)} = \lim_{x\longrightarrow 3} \frac{x-2}{x+2} = \frac{3-2}{3+2} = \frac{1}{5}$$

4 pts 2. Does $\lim\limits_{x\longrightarrow 4} \dfrac{4x-3}{x^2-4}$ exist? Explain your answer.

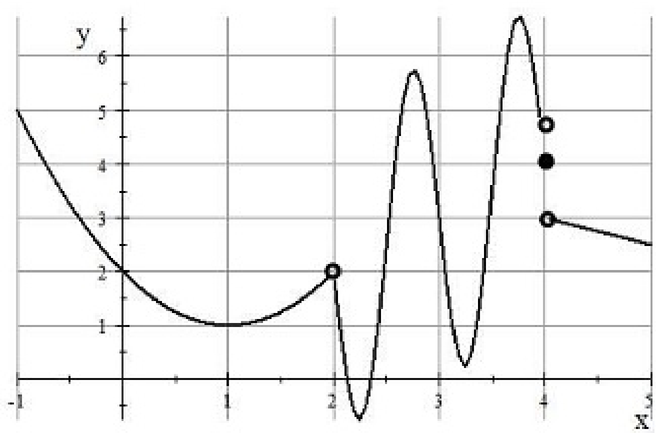
If we input the value $x=4$ into the denominator, we DO NOT get output 0. Therefore, the rational function $f(x) = \dfrac{4x-3}{x^2-4}$ is continuous at $x=4$. This tells us that the limit in question exists. In fact, the direct substitution principle tells us

$$\lim_{x\longrightarrow 4} \frac{4x-3}{x^2-4} = \frac{4(4)-3}{4^2-4} = \frac{13}{12}$$

4 pts 3. Use the graph of the function f below to decide whether each limit exists. If it does, find the value; if not, explain why.

(a) $\lim\limits_{x\longrightarrow 2} f(x) = 2$ (b) $\lim\limits_{x\longrightarrow 4^-} f(x) \approx 4.5$ (c) $\lim\limits_{x\longrightarrow 4^+} f(x) = 3$

(d) $\lim\limits_{x\longrightarrow 3} f(x) = 3$ (e) $\lim\limits_{x\longrightarrow -1^+} f(x) = 5$ (f) $\lim\limits_{x\longrightarrow 4} f(x)$ DNE



The limit in Part (f) does not exist because there is a jump discontinuity in the graph of f at the input value $x=4$. As a result, the values of the left-hand limit does not agree with the value of the right-hand limit.