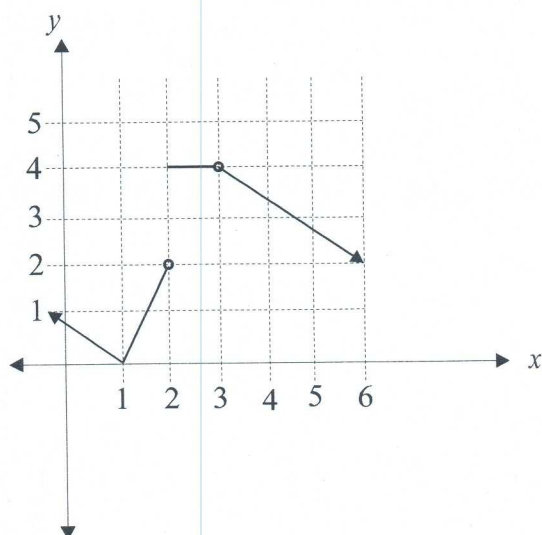


Calculus 1510 Tutorial #1

I. Use the graph below to evaluate the following limits, if they exist.



(a) $\lim_{x \rightarrow 3^-} f(x) =$

(b) $\lim_{x \rightarrow 3^+} f(x) =$

(c) $\lim_{x \rightarrow 3} f(x) =$

(d) $\lim_{x \rightarrow 2} f(x) =$

(e) $\lim_{x \rightarrow 2^+} f(x) =$

(f) $\lim_{x \rightarrow 2} f(x) =$

II. In each of the following cases, determine whether or not the given limit exists. If not, explain why the limit does not exist. In particular if the trend is to $\pm \infty$, indicate so.

(a) $\lim_{x \rightarrow 4} \frac{x^2 - 25}{x - 4}$

(b) $\lim_{x \rightarrow -2} \frac{x^3 + 8}{x + 2}$

(c) $\lim_{x \rightarrow 1} \frac{x^4 - 1}{x - 1}$

(d) $\lim_{x \rightarrow \infty} \frac{x^2 - x - 6}{x^2 - 9}$

(e) $\lim_{x \rightarrow 1^-} \frac{x - 1}{\sqrt{x} - 1}$

(f) $\lim_{x \rightarrow 3} \left(\frac{\frac{1}{x} - \frac{1}{3}}{\frac{x}{x-3}} \right)$

(g) $\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2 - 1}}{x + 10000}$

(h) $\lim_{x \rightarrow 0} \sqrt{x^3 + 4x^2}$

(i) $\lim_{x \rightarrow 0} \sqrt{x^2 - 4x}$

(j) $\lim_{x \rightarrow 0} \sqrt[3]{x^2 - 4x}$

III. A function $f(x)$ is defined as:

$$f(x) = \begin{cases} 1 - x & x > 2 \\ -(x - 1)^2 & x \leq 2 \end{cases}$$

(a) Find $\lim_{x \rightarrow 2^-} f(x)$

(b) Find $\lim_{x \rightarrow 2^+} f(x)$

(c) Does $\lim_{x \rightarrow 2} f(x)$ exist? Give a reason for your answer.

IV Let $m(x) = \frac{|x - 2|}{x^2 - 4}$. In each of the following cases, find the limit if it exists.

(a) $\lim_{x \rightarrow 2^-} m(x)$

(b) $\lim_{x \rightarrow 2^+} m(x)$

(c) $\lim_{x \rightarrow 2} m(x)$