

1: (20 points) Let $f(x)$, $g(x)$, and $h(x)$ be functions. Suppose that

$$\lim_{x \rightarrow 5} f(x) = -1, \quad \lim_{x \rightarrow 5} g(x) = 3, \quad \lim_{x \rightarrow 5} h(x) = 11.$$

Compute the following limits.

(a) $\lim_{x \rightarrow 5} \sqrt{\frac{[f(x)]^2}{g(x)h(x)}}$

(b) $\lim_{x \rightarrow 5} \left[\frac{1}{f(x)} + \frac{f(x)}{g(x) - h(x)} \right]$

2: (20 points) Let $f(x) = \sqrt{x^2 - 1}$. Answer the following questions.

(a) Compute the inverse of $f(x)$. Check your answer using function composition.

(b) Compute the domain and range of $f(x)$ and $f^{-1}(x)$.

3: (20 points) Find the equation of the tangent line of $f(x) = x^2 - x + 1$ when $x = 3$.

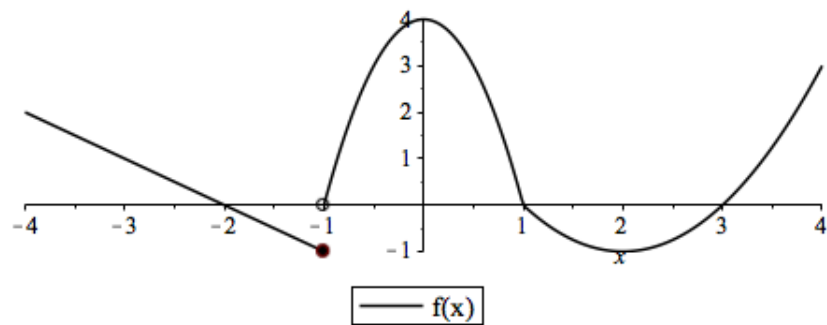
4: (10 points) Compute the following limit.

$$\lim_{x \rightarrow -1} \frac{x^2 + 3x + 2}{x^2 - x - 2}$$

5: (10 points) Compute the following limit.

$$\lim_{x \rightarrow \infty} \sqrt{\frac{27x^2 - 4}{3x^2 + x - 1}}$$

6: (20 points) Use the plot below to compute the following.



(a) Find $\lim_{x \rightarrow -1^+} f(x)$.

(b) Find $\lim_{x \rightarrow -1^-} f(x)$.

(c) Find $f(-1)$.

(d) Does $\lim_{x \rightarrow -1} f(x)$ exist? If so, what is the limit? If not, explain why.