

1. (5 pts each) Find the average rate of change of $f(x) = x^3 + 2x - 5$ over the intervals.
- [1, 1.1]

b. [1, 1.001]

2. (10 pts) Based on your work in #1 (and maybe a few more intervals), what would you estimate the rate of change of f is, at $x = 1$?

3. (10 pts) Compute $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$ to find the slope of the curve of f at $x = 1$.

4. (10 pts) Based on previous work, find the equation of the tangent line to f at $x = 1$.

5. (3 pts each) Use the graph of the function $f(x)$ to evaluate / answer the following:

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

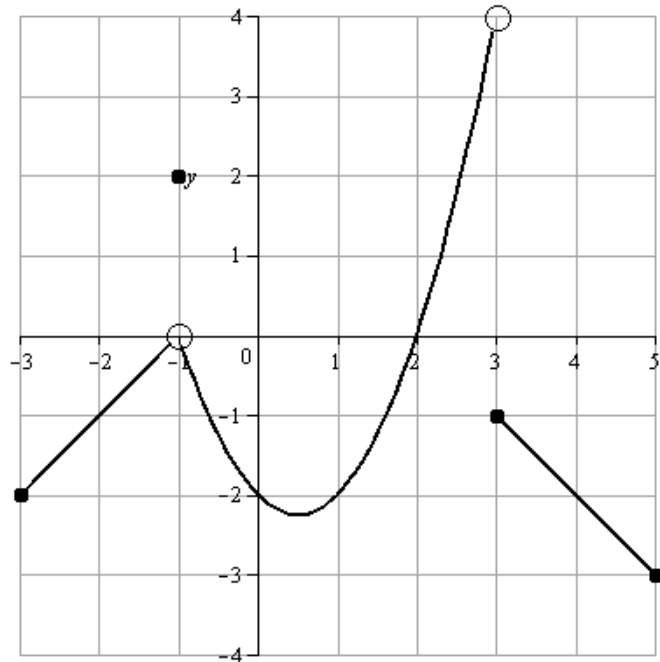
b. $\lim_{x \rightarrow 3^+} f(x)$

c. $\lim_{x \rightarrow -1} f(x)$

d. $\lim_{x \rightarrow 0} f(x)$

e. Where is f continuous?

f. Where does f only have a left-hand limit?



g. Where does f have a removable discontinuity, and what would you define f to be at that point?

6. (10 pts) Let $f(x) = x^2 - 2$. Find a $\delta > 0$ such that $|f(x) - L| < \varepsilon$ whenever $0 < |x - x_0| < \delta$, for $x_0 = 3, L = 7$, and $\varepsilon = 0.3$.

7. (10 pts) Prove that $\lim_{x \rightarrow 3} (5x - 2) = 13$.

8. (5 pts each) Evaluate the limits:

a. $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 + 5x - 14}$

b. $\lim_{x \rightarrow 0} (\tan(3x)\cot(5x))$

8. c. $\lim_{x \rightarrow \infty} \sqrt{9x^2 - x} - 3x$

9. (10 pts) Sketch the graph of $f(x) = \frac{2x^2 + x - 6}{x - 2}$. Include all asymptotes and intercepts.