

Instructions: You must show all work to receive full credit for the problems below. You may check your work with a calculator, but answers without work will receive minimal credit. Use exact answers unless the problem starts with decimals or you are specifically asked to round.

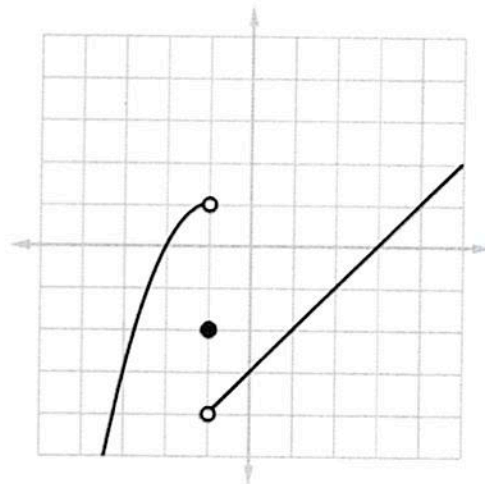
1. Find the following limits using the graph.

a. $\lim_{x \rightarrow -1^-} F(x) = 1$

b. $\lim_{x \rightarrow -1^+} F(x) = -4$

c. $\lim_{x \rightarrow -1} F(x) = \text{DNE}$

d. $F(-1) = -2$



2. Use numerical methods to find the value of $\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{x^2 + x} = 2$

| | | | | | |
|----------|---------|--------|--------|--------|--------|
| 0.00001 | 0.0001 | 0.001 | 0.01 | 0.1 | 1 |
| 2 | 2 | 2 | 2.0001 | 2.0128 | 3.1945 |
| -0.00001 | -0.0001 | -0.001 | -0.01 | -0.1 | -1 |
| 2 | 2 | 2 | 2.0141 | 2.0141 | Error |

3. Evaluate $\lim_{x \rightarrow 2} \frac{x^2 + 3x - 10}{x^2 - 4x + 4}$ algebraically.

$$\lim_{x \rightarrow 2} \frac{(x-2)(x+5)}{(x-2)(x-2)} = \lim_{x \rightarrow 2} \frac{x+5}{x-2} = \frac{7}{0} \text{ undefined}$$

4. Based on data from Major League Baseball, the average price of a ticket to a major league game can be approximated by $p(x) = 0.04x^2 + 0.55x + 8.73$, where x is the number of years after 1991, and $p(x)$ is in dollars.

a. Find $p(5), p(16)$.

$$p(5) = 0.04(5)^2 + 0.55(5) + 8.73 = 12.48$$

$$p(16) = 0.04(16)^2 + 0.55(16) + 8.73 = 27.77$$

b. Find $\frac{p(16)-p(5)}{16-5}$ and interpret the result.

$$\frac{27.77 - 12.48}{11} = \frac{15.29}{11} = 1.39$$

is the average rate of change of
the price of an MLB ticket between
1996 and 2007

5. Find the derivative of the function $f(x) = 2x^2 - x + 1$ using the limit definition.

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{2x^2 + 4xh + h^2 - x - h + 1 - 2x^2 + x - 1}{h} =$$

$$\lim_{h \rightarrow 0} \frac{4xh + h^2 - h}{h} = \lim_{h \rightarrow 0} \frac{h(4x + h - 1)}{h} = 4x - 1$$