

In-Class Problems

1. Let $f(x) = \frac{x^2 - 9}{x - 3}$.

(a) Compute $f(3.1)$, $f(3.01)$, and $f(3.001)$.

(b) Based on your data in part (a), what is $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$?

(c) Use algebra to derive your result from part (a).

(d) What does the graph of this function look like?

2. Let $f(x) = \frac{\sin x}{x}$.

(a) Compute $f(0.1)$, $f(0.01)$, and $f(0.001)$.

(b) Based on your data in part (a), what is $\lim_{x \rightarrow 0} \frac{\sin x}{x}$?

(c) What do you think the graph of this function looks like?

3. Let $f(x) = \sin\left(\frac{1}{x}\right)$.

(a) Compute $f(0.1)$, $f(0.01)$, $f(0.001)$, $f(0.0001)$, and $f(0.00001)$.

(b) Based on your data in part (a), what is $\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right)$?

(c) What do you think the graph of this function looks like?