

ASSIGNMENT 3

Limits at zero and infinity

Reading: §0.1, 1.1, 1.2, 1.5 of Smith-Minton

Exercise 3.1. For each of the following rational functions, compute the limit as $x \rightarrow \infty$ and $x \rightarrow -\infty$. Then draw a sketch of the functions. Your sketch should include all roots and asymptotes.

$$(1) f(x) = \frac{x^2 - 3x + 2}{x + 1}$$

$$(4) f(x) = \frac{x + 1}{x^2 - 2x + 1}$$

$$(2) f(x) = \frac{x^2 - 3x + 2}{x - 1}$$

$$(5) f(x) = \frac{x - 1}{x^2 - 2x + 1}$$

$$(3) f(x) = \frac{x^2 - 3x + 2}{2x^2 - x + 3}$$

$$(6) f(x) = \frac{x - 1}{x^2 - 1}$$

Exercise 3.2. For each of the functions $f(x)$ below do the following:

- Draw a sketch of the graph of the function. (First sketch by hand; then check your sketch using technology.)
- Determine $\lim_{x \rightarrow 0} [f(x)]$.
- Determine $\lim_{x \rightarrow \infty} [f(x)]$.

Here are the functions:

$$(1) f(x) = \frac{x}{x + 1}$$

$$(4) f(x) = \frac{\cos x}{x}$$

$$(2) f(x) = \frac{x + 1}{x}$$

$$(5) f(x) = \frac{\sin x}{x}$$

$$(3) f(x) = x^2 \cos x$$

$$(6) f(x) = \frac{\sin x}{x^2}$$