

6. [12 points]

- a. [2 points] Let $f(x)$ be an odd function whose domain is all real numbers except $x = 3$ and $x = -3$. Suppose that $\lim_{x \rightarrow 3^+} f(x) = \infty$ and $\lim_{x \rightarrow \infty} f(x) = -3$. Compute the following limits. Write “NI” if not enough information has been provided to answer the question.

$$\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}} \qquad \lim_{x \rightarrow -3^-} f(x) = \underline{\hspace{2cm}}$$

- b. [2 points] Which of the following functions dominates the other functions as $x \rightarrow \infty$? Circle your answer.

$$y = 20x^{500} \qquad y = 4(1.05)^x \qquad y = 1000 \log(x) \qquad y = 2e^{0.05x}.$$

- c. [2 points] Fill in the blank space. Your answer may depend on the constant B .

If B is a constant, then $\frac{3^x + Bx^2}{4x^2 + Bx + 10^x} \rightarrow \underline{\hspace{2cm}}$ as $x \rightarrow -\infty$.

- d. [6 points] Consider the function $y = h(x) = 2 + 3 \log(4x + 10)$ with domain $x \geq 0$.
- i) What is the range of $h(x)$ given that its domain is $x \geq 0$? Your answer must be written using interval notation or inequalities.

Range of $h(x)$: $\underline{\hspace{2cm}}$

- ii) Find a formula for $h^{-1}(y)$.

$$h^{-1}(y) = \underline{\hspace{2cm}}.$$