

8. [11 points]

- a. [6 points] Find the following limits. They will either be a real number, ∞ , or $-\infty$.
You don't need to show work but partial credit may be awarded for work shown.

(i)

$$\lim_{x \rightarrow -\infty} \frac{x^3 + x^2 + 100}{3x^2 - x} = \underline{\hspace{2cm}}$$

(ii)

$$\lim_{x \rightarrow \infty} \frac{(7x - 2)^2(x + 3)}{5x^3 + 1} = \underline{\hspace{2cm}}$$

(iii)

$$\lim_{x \rightarrow \infty} \frac{e^x - x^4}{-(10^x) + x^2} = \underline{\hspace{2cm}}$$

- b. [5 points] Consider the rational function:

$$f(x) = \frac{3x^2(x - 3)}{(x + 4)(x - 1)^2(x - 3)}$$

Find the following features or write NONE if none exist. *Show all relevant work.*

(i) Coordinates of any hole(s): $\underline{\hspace{2cm}}$

(ii) Equations for any horizontal asymptote(s): $\underline{\hspace{2cm}}$

(iii) Equations for any vertical asymptotes(s): $\underline{\hspace{2cm}}$