

## Math 220 - Calculus f. Business and Management - Worksheet 12

### Worksheet 12 - Limits as $x$ approaches infinity

#### Simple Limits

*Exercise 1: Compute the following limits:*

$$1a : \lim_{x \rightarrow \infty} 3x^2 - 2x + 4 \quad 1b : \lim_{x \rightarrow \infty} x^5 - 2x^3 + 8 \quad 1c : \lim_{x \rightarrow -\infty} x^5 - 2x^3 + 8$$

*Exercise 2: Compute the following limits:*

$$2a : \lim_{x \rightarrow \infty} \sqrt{x^3 - 2x^2 - 4} \quad 2b : \lim_{x \rightarrow -\infty} \sqrt{x^3 - 2x^2 - 4} \quad 2c : \lim_{x \rightarrow -\infty} e^{x^2 - 3x + 4}$$

*Exercise 3: Compute the following limits:*

$$3a : \lim_{x \rightarrow \infty} e^{5-x} \quad 3b : \lim_{x \rightarrow \infty} \ln(2x + 5) \quad 3c : \lim_{x \rightarrow \infty} \ln(1/x)$$

#### Rational Functions

*Exercise 4: Compute the following limits:*

$$4a : \lim_{x \rightarrow \infty} \frac{3x^2 + 2x - 1}{4x^2 + 2} \quad 4b : \lim_{x \rightarrow \infty} \frac{2x^5 + 5x^2 - 6}{4x^2 + 2} \quad 4c : \lim_{x \rightarrow -\infty} \frac{2x^5 + 5x^2 - 6}{4x^2 + 2}$$

*Exercise 5: Compute the following limits:*

$$5a : \lim_{x \rightarrow -\infty} \frac{x^2 + 12}{3x^4 - 7} \quad 5b : \lim_{x \rightarrow \infty} \frac{2x^2 + 5x + 7}{x^3 - 1} \quad 5c : \lim_{x \rightarrow -\infty} \frac{2x^2 + 5x + 7}{x^3 - 1}$$

#### Other Fractions

*Exercise 6: Compute the following limits.*

$$6a : \lim_{x \rightarrow -\infty} \frac{3}{\ln(x^2)} \quad 6b : \lim_{x \rightarrow -\infty} \frac{-5}{e^x} \quad 6c : \lim_{x \rightarrow -\infty} \frac{3x}{\sqrt{x^2 + 2x - 5}}$$

*Exercise 7: Compute the following limits.*

$$7a : \lim_{x \rightarrow \infty} \frac{3x^2}{\sqrt{x^5 + 4x - 5}} \quad 7b : \lim_{x \rightarrow -\infty} \frac{\sqrt{x^6}}{\sqrt{x^2 - 4x + 5}} \quad 7c : \lim_{x \rightarrow -\infty} \frac{\sqrt[3]{x^7}}{\sqrt{x^3}}$$

#### Horizontal Asymptotes

*Exercise 8 Find the horizontal asymptotes for each function on the worksheet.*