

MATH 141 WORKSHEET 3

Show all work for full credit.

1. Find the limit.

$$\lim_{x \rightarrow 2} \frac{x^2 + 6x - 16}{3x^2 - 5x - 2}$$

2. Find the limit.

$$\lim_{x \rightarrow 1} \frac{(3x + 4)(2x - 2)^2}{(x - 1)^2}$$

3. Find the limit.

$$\lim_{x \rightarrow -2} \frac{x^4 - 8x^2 + 16}{(x + 2)^2}$$

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4. Find the limit.

$$\lim_{x \rightarrow 1} \frac{x^4 + 5x^3 - x - 5}{x^2 + 7x - 8}$$

5. Let $f(x)$ be the following piecewise defined function.

$$f(x) = \begin{cases} 3x + 7 & x \leq 3 \\ x^2 - 2x + 15 & x > 3 \end{cases}$$

Find the limit. If the limit does not exist, you must explain why.

$$\lim_{x \rightarrow 3} f(x)$$

6. Find the limit.

$$\lim_{x \rightarrow 3^+} \frac{x - 5}{x^2 + 4x - 21}$$

7. Find the limit.

$$\lim_{x \rightarrow 9} \frac{\sqrt{x+7} - 4}{x - 9}$$

HINT: Rationalize the numerator.

8. Find the limit.

$$\lim_{x \rightarrow \infty} \frac{x^3 + 27}{3x^3 - 2x^2 - x}$$

9. Find the limit.

$$\lim_{x \rightarrow -\infty} \frac{5x^3 - x^2 + 1}{3 - x^2}$$

This page to be completed after Friday's lecture.

10. Find the limit.

$$\lim_{x \rightarrow 0} x \cot(5x)$$

11. Find the limit.

$$\lim_{x \rightarrow 0} \frac{(5x + \sin x)^2}{3x^2}$$

12. Let $f(x)$ be defined as follows:

$$f(x) = \begin{cases} x^2 + 5x - 24 & x < 2 \\ ax + b & 2 \leq x < 5 \\ 3x + 2 & x \geq 5 \end{cases}$$

Find the values of a and b so that $f(x)$ is continuous everywhere.