Calculus 1 Workbook

Solving limits

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MATH

SOLVING WITH SUBSTITUTION

■ 1. What is the value of the limit?

$$\lim_{x \to 3} -x^4 + x^3 + 2x^2$$

■ 2. What is the value of the limit?

$$\lim_{x \to 7} \frac{x^2 - 5}{x^2 + 5}$$

■ 3. What is the value of the limit.

$$\lim_{x \to -2} \frac{x^3 - 5x^2 + 4x - 6}{x^2 + 7x + 6}$$

SOLVING WITH FACTORING

■ 1. What is the value of the limit?

$$\lim_{x \to -7} \frac{6x^3 + 42x^2}{2x^2 + 26x + 84}$$

■ 2. What is the value of the limit?

$$\lim_{x \to 10} \frac{3x^2 - 39x + 90}{x^2 - 3x - 70}$$

■ 3. What is the value of the limit?

$$\lim_{x \to -8} \frac{2x^2 + 10x - 48}{8x + 64}$$

■ 4. What is the value of the limit?

$$\lim_{x \to 7} \frac{x^3 - x^2 - 42x}{2x^2 - 20x + 42}$$

■ 5. What is the value of the limit?

$$\lim_{x \to 8} \frac{x^2 + 2x - 80}{2x^3 - 24x^2 + 64x}$$

SOLVING WITH CONJUGATE METHOD

■ 1. What is the value of the limit?

$$\lim_{x \to 16} \frac{3(x - 16)}{\sqrt{x} - 4}$$

■ 2. What is the value of the limit?

$$\lim_{x \to 9} \frac{5(\sqrt{x} - 3)}{x - 9}$$

■ 3. What is the value of the limit?

$$\lim_{x \to 25} \frac{2(x - 25)}{\sqrt{x} - 5}$$

■ 4. What is the value of the limit?

$$\lim_{x \to 49} \frac{x - 49}{3(\sqrt{x} - 7)}$$

■ 5. What is the value of the limit?

$$\lim_{x \to 1} \frac{8(x-1)}{3(\sqrt{x}-1)}$$

INFINITE LIMITS AND VERTICAL ASYMPTOTES

■ 1. What is the value of the limit?

$$\lim_{x \to 2} \frac{x^2 - x - 6}{-3x^2 - 3x + 18}$$

■ 2. What is the value of the limit?

$$\lim_{x \to -1} \frac{x^2 + x - 6}{4x^2 + 16x + 12}$$

■ 3. What is the value of the limit?

$$\lim_{x \to -4} \frac{x + 5}{-4x - 16}$$

■ 4. What is the value of the limit?

$$\lim_{x \to -1} \frac{x^2 - 9}{3x^2 - 6x - 9}$$

■ 5. What is the value of the limit?

$$\lim_{x \to 3} \frac{x^2 - 4x}{x^2 - 2x - 3}$$

■ **6. What is the value of the limit?**

$$\lim_{x \to -2} \frac{x^2 - 16}{-x^2 + x + 6}$$

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LIMITS AT INFINITY AND HORIZONTAL ASYMPTOTES

■ 1. What is the value of the limit?

$$\lim_{x \to \infty} \frac{3x^3 - 5x + 2}{9x^3 + 7x^2 - x}$$

■ 2. What is the value of the limit?

$$\lim_{x \to -\infty} \frac{4x^2 + 3x + 5}{-2x^2 + x - 9}$$

■ 3. What is the value of the limit?

$$\lim_{x \to \infty} \frac{x^3 + 6x^2 - 4x + 1}{x^3 + 9x + 8}$$

■ 4. What is the value of the limit?

$$\lim_{x \to \infty} \frac{3x^2 + 5x + 8}{x^3 - 5x - 9}$$
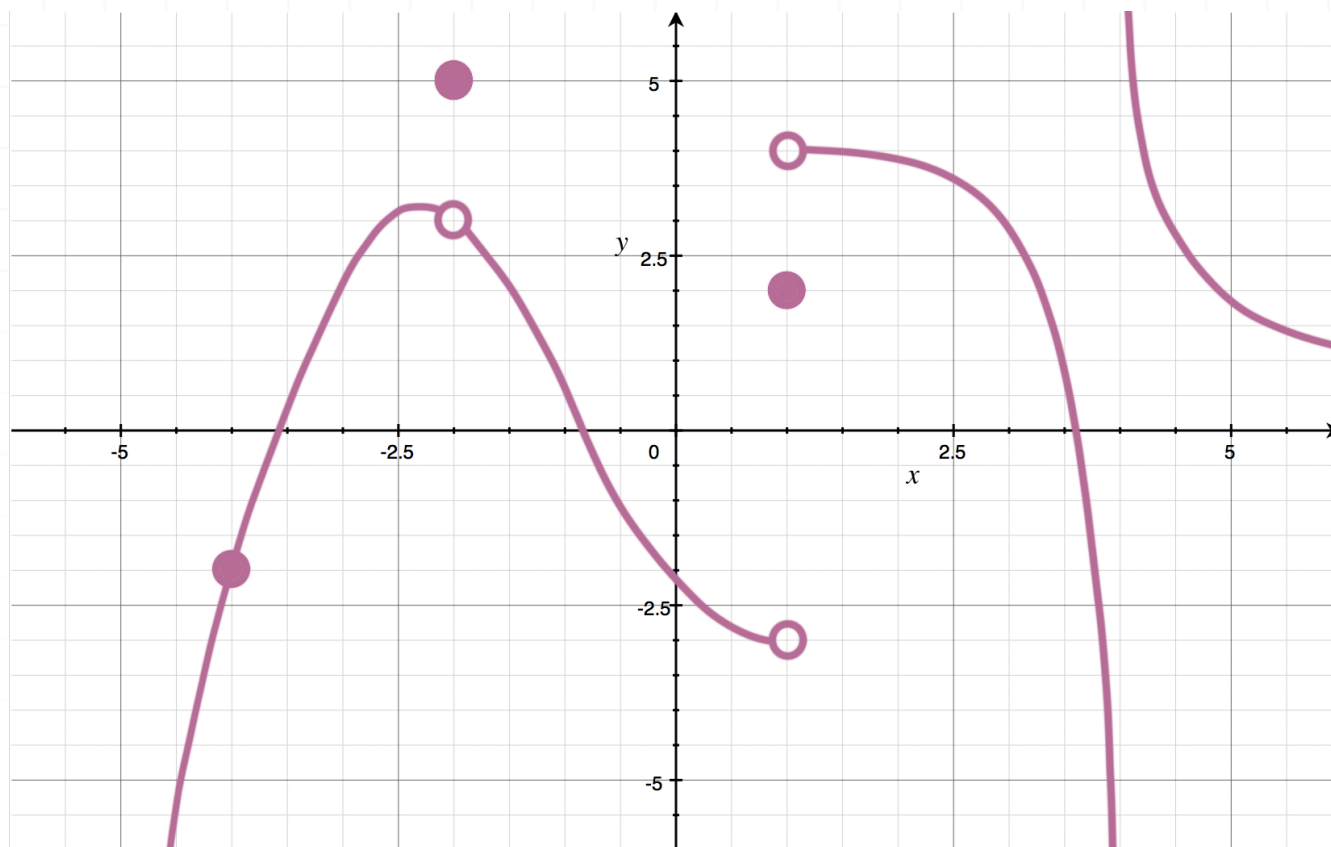
■ 5. What is the value of the limit?
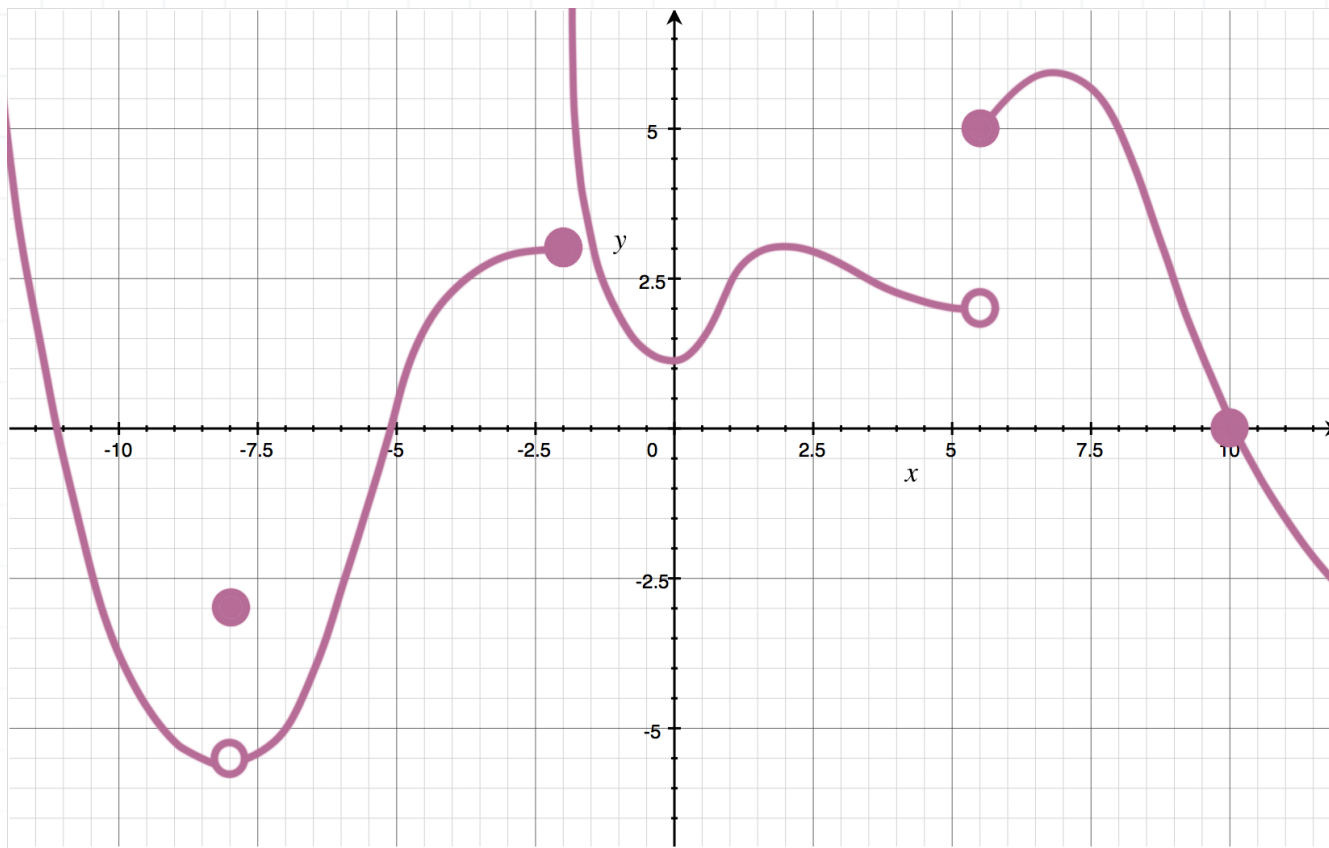
$$\lim_{x \to -\infty} \frac{19x + 21}{x^3 + 15x + 11}$$

CRAZY GRAPHS

■ 1. Use the graph to find the value of $\lim\limits_{x \to 1} f(x)$.

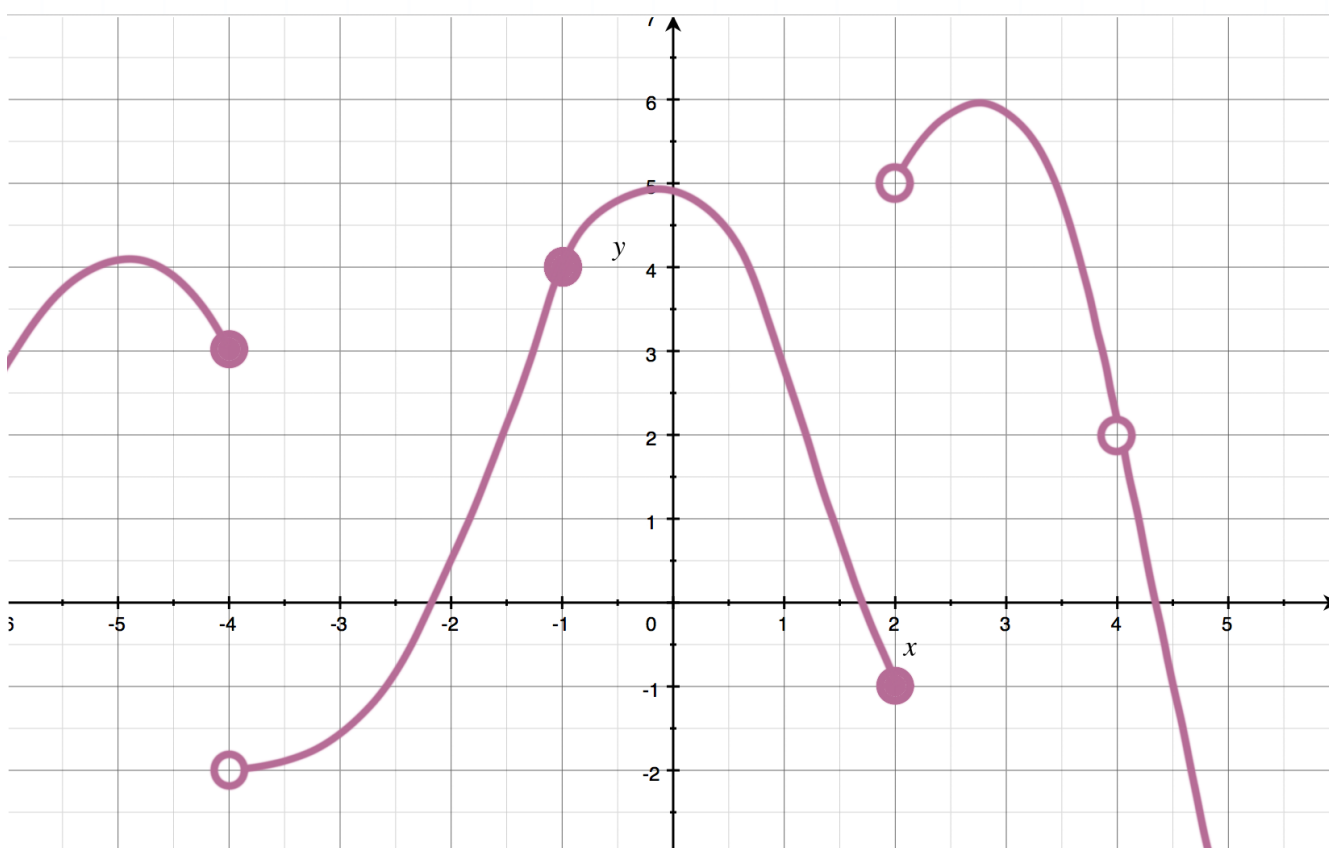■ 2. Use the graph to find the value of $\lim\limits_{x \to 5.5} g(x)$.

■ 3. Use the graph to find the value of $\lim\limits_{x \to 4} h(x)$.

TRIGONOMETRIC LIMITS

■ **1. Find** $\lim\limits_{x \to \pi} f(x)$ **if** $f(x) = 3\cos x - 2$.

■ **2. Find** $\lim\limits_{x \to \frac{3\pi}{2}} g(x)$ **if** $g(x) = 4\sin x + 1$.

■ **3. Find** $\lim\limits_{x \to -\frac{3\pi}{2}} h(x)$ **if** $h(x) = \tan\left(\dfrac{x}{6}\right)$.

MAKING THE FUNCTION CONTINUOUS

■ 1. What value of c makes the function $h(x)$ continuous if c is a constant?

$$h(x) = \begin{cases} x^2 & x \leq 4 \\ 3x + c & x > 4 \end{cases}$$

■ 2. What value of c makes the function $f(x)$ continuous if c is a constant?

$$f(x) = \begin{cases} 5x - c & x \leq 3 \\ 3x + 4 & x > 3 \end{cases}$$

■ 3. What value of c makes the function $g(x)$ continuous if c is a constant?

$$g(x) = \begin{cases} x^2 - 4x + 8 & x \leq 2 \\ cx - 2 & x > 2 \end{cases}$$

■ 4. What value of c makes the function $f(x)$ continuous if c is a constant?

$$f(x) = \begin{cases} 2x^3 - 6x^2 + 8x + 3 & x \leq 1 \\ cx + 9 & x > 1 \end{cases}$$

■ 5. What value of c makes the function $g(x)$ continuous if c is a constant?

$$g(x) = \begin{cases} \sqrt{x} + 18 & x \leq 16 \\ x - 2c & x > 16 \end{cases}$$

■ 6. What value of c makes the function $h(x)$ continuous if c is a constant?

$$h(x) = \begin{cases} 11x - 9 & x \leq 3 \\ x^2 + 3x + c & x > 3 \end{cases}$$