Evaluate:

1. $$\lim_{x \to 4} \left(\frac{x^2 - 6x + 8}{x - 2} \right)$$

2. $$\lim_{x \to 9} \left(\frac{\sqrt{x} - 3}{x - 9} \right)$$

: : reset

Bellwork 9/15 - Solutions

1.

$$\lim_{x \to 4} \left(\frac{x^2 - 6x + 8}{x - 2} \right)$$

$$= \lim_{x \to 4} \left[\frac{(x-4)\cancel{(x-2)}}{\cancel{x-2}} \right]$$

$$= \lim_{x \to 4} (x - 4)$$

$$= \boxed{0}$$

2.

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

$$= \lim_{x \to 9} \left[\frac{\sqrt{x} - 3}{(\sqrt{x})^2 - 3^2} \right]$$

$$= \lim_{x \to 9} \left[\frac{\cancel{\sqrt{x} - 3}}{\cancel{(\sqrt{x} - 3)}(\sqrt{x} + 3)} \right]$$

$$= \lim_{x \to 9} \left(\frac{1}{\sqrt{x} + 3} \right)$$

$$= \boxed{\frac{1}{6}}$$

Exercise 1

Let g and h be the functions defined by:

$$g(x) = \sin\left(\frac{\pi}{2}x\right) + 4;\ h(x) = -\frac{1}{4}x^3 + \frac{3}{4}x + \frac{9}{2}$$

If a function f satisfies

$$g(x) \leq f(x) \leq h(x) \text{ for } -1 < x < 2,$$

what is $\lim\limits_{x \to 1} f(x)$?

1. 4
2. $\frac{9}{2}$
3. 5
4. The limit cannot be determined from the information given.

Exercise 2

For all $x \neq 0$, let f, g, and h be the functions:

$$f(x) = \frac{1 - \cos(x)}{x^2},\ g(x) = x^2 \sin\left(\frac{1}{x}\right),\ \text{and}\ h(x) = \frac{\sin(x)}{x}$$

Which of the following inequalities can be used with the squeeze theorem to find the limit of the function as $x \to 0$?

1. $$\tfrac{1}{3}(1 - x^2) \leq f(x) \leq \tfrac{1}{2}$$
2. $$-x^2 \leq g(x) \leq x^2$$
3. $$-\tfrac{1}{|x|} \leq h(x) \leq \tfrac{1}{|x|}$$

(All of the inequalities are true for $x \neq 0$.)

Exercise 3

Let g and h be the functions defined by:

$$g(x) = \sin\left[\frac{\pi}{2}(x+2)\right] + 3;\ h(x) = \frac{1}{4}x^3 - \frac{3}{2}x^2 - \frac{9}{4}x + 3$$

If f is a function that satisfies

$$g(x) \le f(x) \le h(x) \text{ for } -2 < x < 0,$$

what is $\lim_{x \to -1} f(x)$?

1. 3
2. 3.5
3. 4
4. The limit cannot be determined from the information given.