

1. Solve:

$$\sqrt{5-x} (\sqrt{-2x} - \sqrt{5-x}) = \frac{-3}{\sqrt{5-x}} \sqrt{5-x}$$

$$\sqrt{-2x(5-x)} - (5-x) = -3$$

$$\sqrt{-10x+2x^2} - 5 + x = -3$$

$$\sqrt{2x^2-10x} = 2-x$$

$$2x^2-10x = (2-x)^2$$

$$2x^2-10x = 4-4x+x^2$$

$$x^2-6x-4=0$$

$$x = 3 \pm \sqrt{13}$$

CK

$$x = 3 + \sqrt{13}$$

$$\sqrt{-2(3+\sqrt{13})} - \sqrt{5-(3+\sqrt{13})} = \frac{-3}{\sqrt{5-(3+\sqrt{13})}}$$

$$\sqrt{-6-2\sqrt{13}}$$

$$x = 3 - \sqrt{13} \text{ use calc.}$$

$$\approx -1.2659 \approx -1.2677$$

Answer

$$3 - \sqrt{13}$$

2. Solve:

$$\frac{\sqrt{x}}{\sqrt{x}-1} + 3 = \frac{1}{\sqrt{x}-1} - 1$$

$$(\sqrt{x}-1) \left( \frac{\sqrt{x}}{\sqrt{x}-1} + 4 \right) = \left( \frac{1}{\sqrt{x}-1} \right) (\sqrt{x}-1)$$

$$\sqrt{x} + 4(\sqrt{x}-1) = 1$$

$$\sqrt{x} + 4\sqrt{x} - 4 = 1$$

$$5\sqrt{x} = 5$$

$$\sqrt{x} = 1$$

$$x = \pm 1$$

CK

$$x = -1 \quad \times$$

$$x \rightarrow \frac{\sqrt{-1}}{\sqrt{-1}-1} \dots$$

$$x = 1$$

$$x \rightarrow \frac{\sqrt{1}}{\sqrt{1}-1} + 4 \text{ also no good}$$

Answer

 $\emptyset$ 

3. Verify by composition of functions that the two functions are inverses.

$$f(x) = \frac{2}{5}x - 9$$

$$h(x) = \frac{5}{2}x + 22.5$$

$$f(h(x)) = x ? \quad h(f(x)) = x ?$$

$$f(h(x)) = \frac{2}{5} \left( \frac{5}{2}x + \frac{45}{2} \right) - 9$$

$$= x + \frac{45}{5} - 9$$

$$= x$$

$$h(f(x)) = \frac{5}{2} \left( \frac{2}{5}x - 9 \right) + \frac{45}{2}$$

$$= x - \frac{45}{2} + \frac{45}{2}$$

$$= x$$

This verifies that  $f(x)$  +  $g(x)$  are inverses.

b/c  $f(h(x)) = x$  and  $h(f(x)) = x$ .

4. The following questions apply to  $f(x) = x^2 + 10x - 2$ , complete each:

a) find the  $f^{-1}(x)$

$$y = x^2 + 10x - 2$$
$$x = y^2 + 10y - 2$$
$$x + 2 = y^2 + 10y$$
$$x + 2 + 25 = y^2 + 10y + 25$$
$$x + 27 = (y + 5)^2$$

$$\pm \sqrt{x+27} = y + 5$$
$$-5 \pm \sqrt{x+27} = y$$

Answer  $f^{-1}(x) = -5 + \sqrt{x+27}$

b) State the domain and range of  $f^{-1}(x)$  in interval notation.

Answer  $D: [-27, \infty)$   
 $R: [-5, \infty)$

c) Give the coordinates for these critical points.

Vertex of  $f(x)$ :  $(-5, -27)$       vertex of  $f^{-1}(x)$ :  $(-27, -5)$

$$x = \frac{-10}{2} = -5$$
$$y = -27$$

d) State the domain and range of  $f(x)$  in interval notation.

Answer  $D: [-5, \infty)$   
 $R: [-27, \infty)$

# #4 of Practice Quiz



