Chapter 3 Review Section 3.1 Extra Practice

1. Graph each function using a table of values. Then, identify the domain and range.

a) $y=\sqrt{x+2}$ **b)** $y=\sqrt{x}-4$

c) $y=\sqrt{5-x}$ **d)** $y=\sqrt{-3x+1}$

2. Explain how to transform the graph of $y=\sqrt{x}$ to obtain the graph of each function. State the domain and range in each case.

a) $y=3\sqrt{x-5}$ **b)** $y=-\sqrt{x}+7$

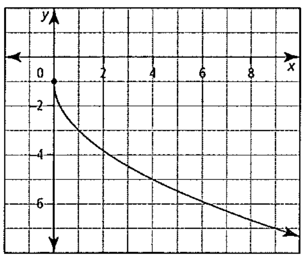
c) $y=0.25\sqrt{0.25x}-3$ **d)** $5+y=\sqrt{-(x+1)}$

3. Match each function with its graph.

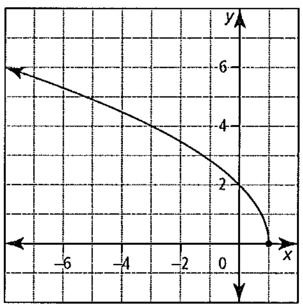
a) $y=2\sqrt{x}-1$ **b)** $y=-2\sqrt{x}-1$

c) $y=2\sqrt{x-1}$ **d)** $y=2\sqrt{-(x-1)}$

A



B



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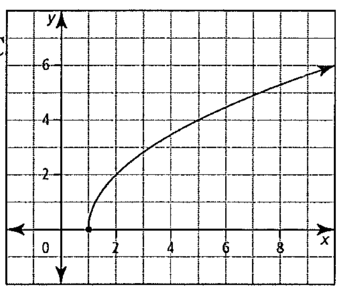
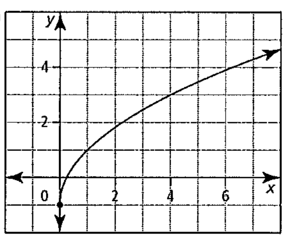


D



4. Write the equation of a radical function that would result by applying each set of transformations to the graph of $y=\sqrt{x}$.

a) vert. exp by a factor of 3, and hor. comp. by a factor of 2

b) horizontal reflection in the y-axis, translation up 3 units, and translation left 2 units

c) vert. reflection in the x-axis, horizontal stretch by a factor of $\frac{1}{3}$, and translation down 7 units

d) vertical exp. by a factor of 5, horizontal comp. by a factor of 0.25, and translation right 6

5. Explain how to transform the graph of $y=\sqrt{x}$ to obtain the graph of each function.

a) $y=5\sqrt{x+7}-2$ **b)** $y=-4\sqrt{-x}+8$

c) $y=\sqrt{0.25(x-1)}$ **d)** $y+3=\sqrt{\frac{1}{3}(x+4)}$

6. Sketch each set of functions on the same graph.

a) $y=-\sqrt{x}$, $y=-\sqrt{x-3}+5$ **b)** $y=4\sqrt{x}$, $y=4\sqrt{\frac{1}{3}x}$

c) $y=-\sqrt{x}$, $y=-\sqrt{2x}$

7. Sketch the graph of each function using transformations.

a) $y=2\sqrt{x-4}-5$ **b)** $y=-3\sqrt{x}+6$

c) $y=-\sqrt{0.5x}+1$ **d)** $y-9=\sqrt{2(x+3)}$

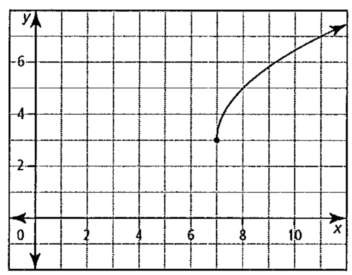
8. State the domain and range of each function.

a) $y=\sqrt{-x}-4$ **b)** $y=4\sqrt{x-4}$

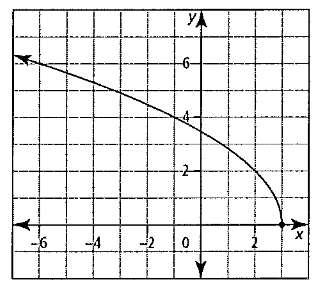
c) $y-4=-\sqrt{x-4}$ **d)** $y=-\sqrt{4x}$

9. For each function, write an equation of a radical function of the form $y=a\sqrt{b(x-h)}+k$.

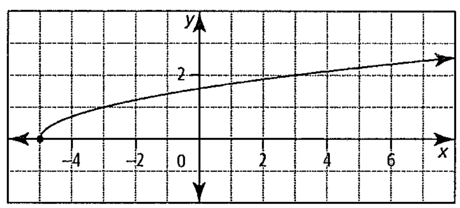
a)



b)



c)



10. Explain how to transform the graph of $y=\sqrt{x}$ to obtain the graph of each function.

a) $y=\sqrt{-x-7}$ **b)** $y=\sqrt{2x-6}+5$ **c)** $y-7=\sqrt{5-x}$

Section 3.2 Extra Practice

1. Complete the table.

x	$f(x)$	$\sqrt{f(x)}$
−2	16	
−1	8	
0		2
1		1.4
2	1	

2. For each point given on the graph of $y=f(x)$, does a corresponding point on the graph of $y=\sqrt{f(x)}$ exist? If so, state the coordinates to the nearest hundredth.

a) (9, 14) **b)** (p, r) **c)** (−2, 7) **d)** (−32, −1)

3. For each function, graph $y=\sqrt{f(x)}$.

a) $f(x)=x^2-9$ b) $f(x)=-x^2+9$ c) $f(x)=x^2+9$

4. a) Sketch the graph of $f(x)=x+4$.
b) State the domain and range of $y=f(x)$.
c) Sketch the graph of $y=\sqrt{f(x)}$.
d) State the domain and range of $y=\sqrt{f(x)}$.

5. For each function, graph $y=\sqrt{f(x)}$ and state the domain and range of $y=\sqrt{f(x)}$.

a) $f(x)=x-4$ b) $f(x)=x+9$ c) $f(x)=x-9$

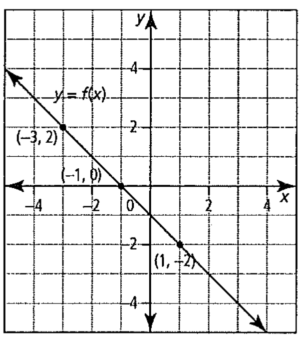
6. Determine the domains and ranges of each pair of functions. Explain why the domains and ranges differ.

a) $y=x+5,\ y=\sqrt{x+5}$ b) $y=3x-9;\ y=\sqrt{3x-9}$
c) $y=-x-10,\ y=\sqrt{-x-10}$

7. Identify the domain and range of $y=\sqrt{f(x)}$.

a) $f(x)=x^2-16$ b) $f(x)=x^2+5$ c) $f(x)=2x^2+18$

8. Using the graph of $y=f(x)$, sketch the graph of $y=\sqrt{f(x)}$.



9. a) Sketch the graphs of $y=x^2+x-20$ and $y=\sqrt{x^2+x-20}$.
b) Why is the graph of $y=\sqrt{x^2+x-20}$ undefined over an interval?

10. a) Give examples of points on the graph of $y=f(x)$ that would be invariant when graphing $y=\sqrt{f(x)}$.
b) Give examples of points on of $y=f(x)$ that would be undefined on the graph of $y=\sqrt{f(x)}$.

Section 3.3 Extra Practice

1. Solve each equation algebraically.

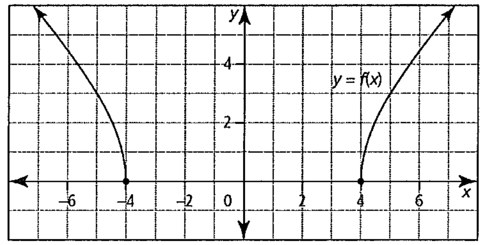
a) $\sqrt{x+1}+3=5$ b) $\sqrt{4-3x}=2$
c) $\sqrt{0.5(3x-2)}+2=1$ d) $-3\sqrt{x+2}+4=1$

radical equation?

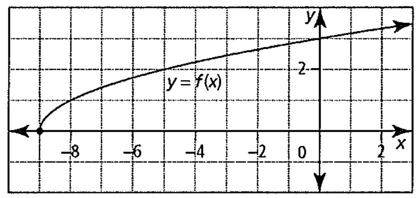
a) $\sqrt{5x^2+11}=x+5$ b) $x+3=\sqrt{2x^2-7}$
c) $\sqrt{13-4x^2}=2-x$ d) $x+\sqrt{-2x^2+9}=3$

3. Use each graph to solve the equation $f(x)=0$.

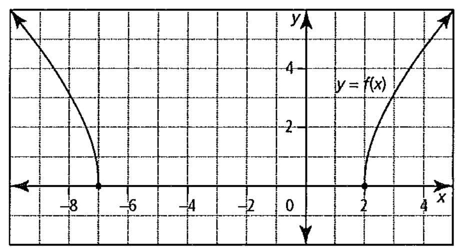
a)



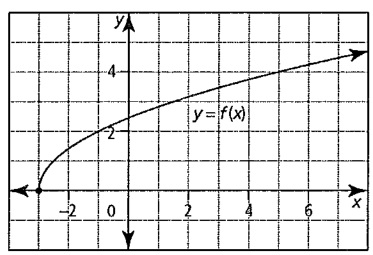
b)



c)



d)



4. Solve each equation graphically.

a) $\sqrt{2x+1}=3$ b) $\sqrt{x-3}+6=2$
c) $\sqrt{4(x+3)}=6$ d) $2\sqrt{x-1}-2=8$

5. Solve. a) $x-\sqrt{x+2}=0$ b) $\sqrt{x+4}+8=x$
c) $\sqrt{x-1}+3-x=0$ d) $x=\sqrt{x+10}+2$

6. Solve to the nearest tenth.

a) $\sqrt{x-2}=x-3$ b) $\sqrt{x+1}+5=2x$
c) $x\sqrt{3}+4=x$ d) $\sqrt{x^2-4}=2x-10$

7. Tanya says that the equation $\sqrt{1-x}+2=0$ has no solutions.

a) Show that Tanya is correct, using both a graphical and an algebraic approach.
b) Is it possible to tell that this equation has no solutions simply by examining the equation? Explain.

c) horizontal exp. by a factor of 4, translation right 1 unit
c) horizontal exp. by a factor of 4, translation right 1 unit

8. The speed of a tsunami wave in the ocean is related to the depth of the water by the equation $s = 3\sqrt{d}$, where s is the speed of the wave, in metres per second, and d is the depth of the water, in metres. What is the depth of the water, to the nearest metre, if the speed of a tsunami wave is 10 m/s?

9. The radius, r, of a sphere is related to the surface area, A, by the equation $r = \frac{1}{2}\sqrt{\frac{A}{\pi}}$.

   a) The surface area of a baseball is about 172 cm^2. Find the radius of a baseball, to the nearest tenth of a centimetre.

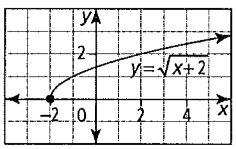
   b) The radius of a tennis ball is about 3.3 cm. Find the surface area, to the nearest square centimetre.

10. Solve. $\sqrt{x + \sqrt{x-2}} = 2$

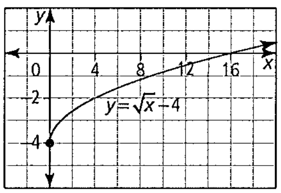
Chapter 3 Answers

Section 3.1 Extra Practice

1. a)



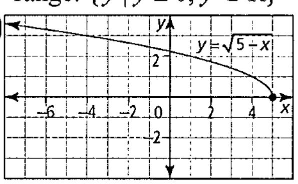
b)



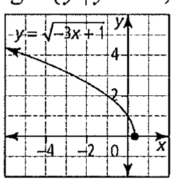
domain: $\{x \mid x \ge -2, x \in R\}$; range: $\{y \mid y \ge 0, y \in R\}$

domain: $\{x \mid x \ge 0, x \in R\}$; range: $\{y \mid y \ge -4, y \in R\}$

c)



d)



domain: $\{x \mid x \le 5, x \in R$

range: $\{y \mid y \ge 0, y \in R\}$

domain: $\{x \mid x \le \frac{1}{3}, x \in R\}$;

range: $\{y \mid y \ge 0, y \in R\}$

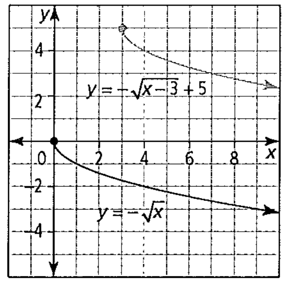
2. a) vertical exp. by a factor of 3, translation right 5 units; domain:$\{x \mid x \ge 5, x \in R\}$; range: $\{y \mid y \ge 0, y \in R\}$
b) vertical reflection in the x-axis, translation up 7 units; domain: $\{x \mid x \ge 0, x \in R\}$; range: $\{y \mid y \le 7, y \in R\}$
c) vertical comp. by a factor of 0.25, horizontal comp. by a factor of 4, translation down 3 units; domain: $\{x \mid x \ge 0, x \in R\}$; range: $\{y \mid y \ge -3, y \in R\}$
d) horizontal reflection in the y-axis, translation left 1, translation down 5; domain: $\{x \mid x \le -1, x \in R\}$; range: $\{y \mid y \ge -5, y \in R\}$

3. a) D **b)** A **c)** C **d)** B

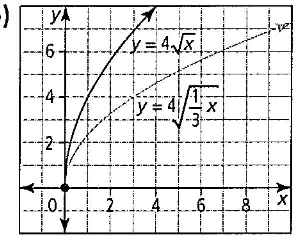
4. a) $y = 3\sqrt{0.5x}$ **b)** $y = \sqrt{-(x+2)} + 3$
c) $y = -\sqrt{3x} - 7$ **d)** $y = 5\sqrt{4(x-6)}$

5. a) vertical exp. by a factor of 5, translation down 2, translation left 7
b) vertical exp. by a factor of 4, reflection in the x-axis, reflection in the y-axis, translation up 8.
d) horizontal exp. by a factor of 3, translation down 3, translation left 4

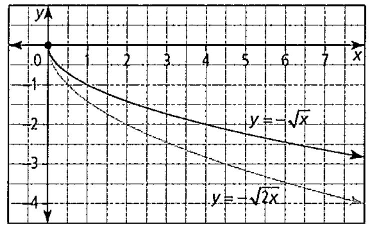
6. a)



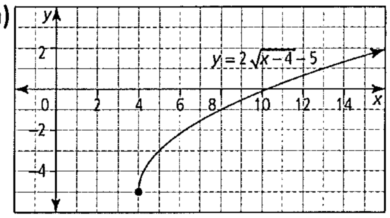
b)



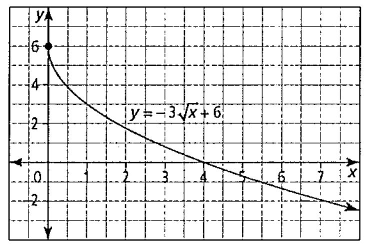
c)



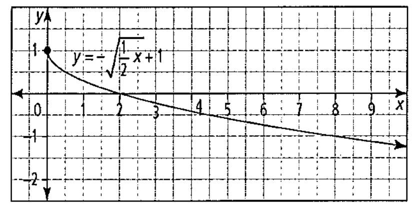
7a)



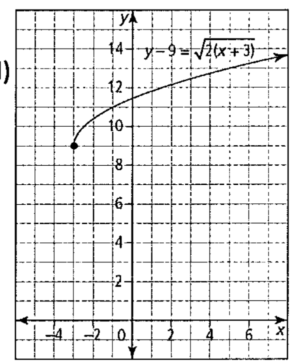
b)



c)



d)



8. a) domain: $\{x \mid x \le 0, x \in R\}$; range: $\{y \mid y \ge -4, y \in R\}$ **b)** domain: $\{x \mid x \ge 4, x \in R\}$; range:$\{y \mid y \ge 0, y \in R\}$ **c)** domain: $\{x \mid x \ge 4, x \in R\}$; range:$\{y \mid y \le 4, y \in R\}$
d) domain: $\{x \mid x \ge 0, x \in R\}$; range: $\{y \mid y \le 0, y \in R\}$

9. a) $y = 2\sqrt{x-7} + 3$ **b)** $y = 2\sqrt{-(x-3)}$ **c)** $y = \sqrt{0.5(x+5)}$

10. a) reflection in the y-axis, translation left 7 units
b) horizontal comp. by a factor of $\frac{1}{2}$, translation right 3 units, translation up 5 units
c) reflection in y-axis, translation right 5 , translation up 7

Section 3.2 Extra Practice

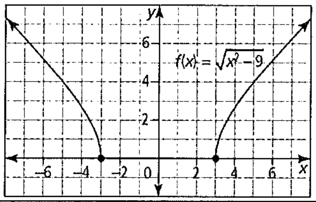
1.

x	$f(x)$	$\sqrt{f(x)}$
−2	16	4
−1	8	2.83
0	4	2
1	1.96	1.4
2	1	1

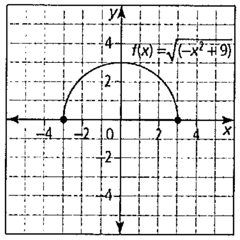
2. a) (9, 3.74)
b) $(p, \sqrt{r})$
c) (−2, 2.65)
d) No corresponding point exists.

7. a) domain: $\{x \mid x \le -4 \text{ and } x \ge 4, x \in R\}$; range: $\{y \mid y \ge 0, y \in R\}$

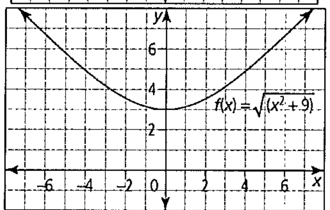
3. a)



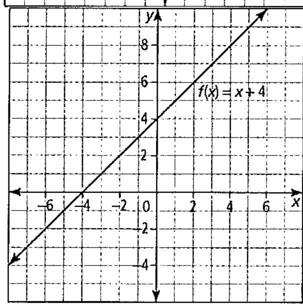
b)



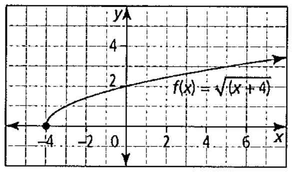
c)



4. a)



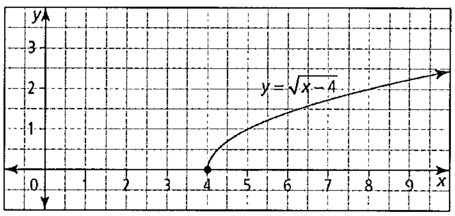
c)



d) domain: $\{x \mid x \geq -4, x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

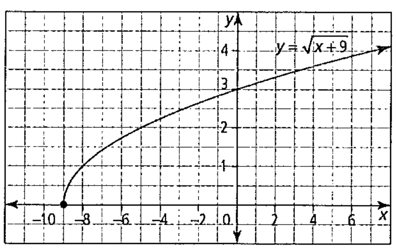
b) domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \in \mathrm{R}\}$

5. a)



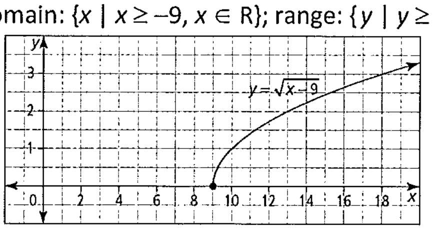
domain: $\{x \mid x \geq 4, x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

b)



domain: $\{x \mid x \geq -9, x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

c)



domain: $\{x \mid x \geq 9, x \in \mathrm{R}\}$; range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

6. a) $y = x + 5$: domain: $\{x \mid x \in \mathrm{R}\}$, range: $\{y \mid y \in \mathrm{R}\}$;
$y = \sqrt{x + 5}$: domain: $\{x \mid x \geq -5, x \in \mathrm{R}\}$, range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

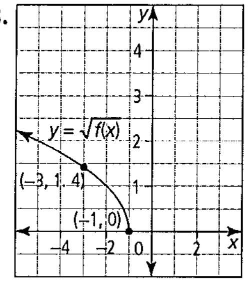
b) $y = 3x - 9$: domain: $\{x \mid x \in \mathrm{R}\}$, range: $\{y \mid y \in \mathrm{R}\}$;
$y = \sqrt{3x - 9}$: domain: $\{x \mid x \geq 3, x \in \mathrm{R}\}$, range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

c) $y = -x - 10$: domain: $\{x \mid x \in \mathrm{R}\}$, range: $\{y \mid y \in \mathrm{R}\}$;
$y = \sqrt{-x - 10}$: domain: $\{x \mid x \leq -10, x \in \mathrm{R}\}$, range: $\{y \mid y \geq 0, y \in \mathrm{R}\}$

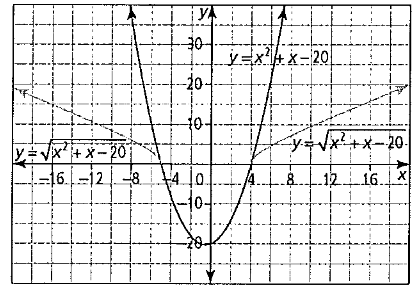
b) domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq \sqrt{5},\ y \in \mathrm{R}\}$

c) domain: $\{x \mid x \in \mathrm{R}\}$; range: $\{y \mid y \geq \sqrt{18},\ y \in \mathrm{R}\}$

8.



9. a)



9b) Example: The graph of $y = x^2 + x - 20$ has y-values that are less than zero for values of x between −5 and 4. Therefore, $y = \sqrt{x^2 + x - 20}$ is undefined for this interval of x.

10. a) Example: all points that have a y-value of 0 or 1
b) Example: all points that have a negative y-value

Section 3.3 Extra Practice

1. a) $x = 3$ **b)** $x = 0$ **c)** no solution **d)** $x = -1$

2. Example: In each case, graph the single function and identify the x-intercepts or graph the set of functions and identify the x-value of the point of intersection.

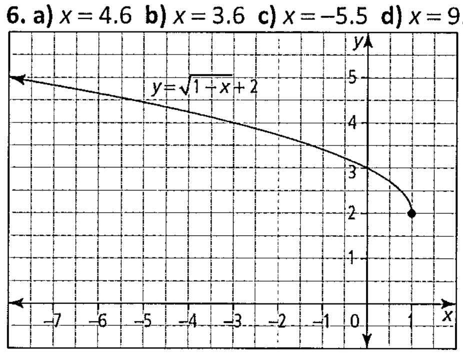
a) $y = \sqrt{5x^2 + 11} - x - 5$ or $y = \sqrt{5x^2 + 11}$, $y = x + 5$

b) $y = \sqrt{2x^2 - 7} - x - 3$ or $y = \sqrt{2x^2 - 7}$, $y = x + 3$

c) $y = \sqrt{13 - 4x^2} - 2 + x$ or $y = \sqrt{13 - 4x^2}$, $y = 2 - x$

d) $y = \sqrt{-2x^2 + 9} + x - 3$ or $y = \sqrt{-2x^2 + 9}$, $y = 3 - x$

3. a) $x = 4$ and $x = -4$ **b)** $x = -9$ **c)** $x = 2$ and $x = -7$ **d)** $x = -3$
4. a) $x = 4$ **b)** no solution **c)** $x = 6$ **d)** $x = 26$
5. a) $x = 2$ **b)** $x = 12$ **c)** $x = 5$ **d)** $x = 6$
6. a) $x = 4.6$ **b)** $x = 3.6$ **c)** $x = -5.5$ **d)** $x = 9.8$



algebraic approach:

$$\sqrt{1 - x} + 2 = 0$$
$$\sqrt{1 - x} + 2 - 2 = 0 - 2$$
$$\sqrt{1 - x} = -2$$

This result is not possible because a square root cannot equal a negative value.

b) Example: Yes; isolate the radical. If it is equal to a negative value, then the equation has no solution.

8. 11 m **9. a)** 3.7 cm **b)** 137 cm^2 **10.** $x = 3$