

Name: _____

Date: _____

Math 10/11 Enriched: Section 5.1 Graphing and Solving Basic Functions

1. Given each of the following root functions, indicate the domain and range:

a) $y = \sqrt{x+3}$ Domain: _____ Range: _____	b) $y = \sqrt{2x-5}$ Domain: _____ Range: _____	c) $y = \sqrt{6-2x}$ Domain: _____ Range: _____
d) $y = -\sqrt{3x+1}$ Domain: _____ Range: _____	e) $y = -\sqrt{6-2x}$ Domain: _____ Range: _____	f) $y = \sqrt{8+0.5x}$ Domain: _____ Range: _____

2. Given each of the following reciprocal functions, indicate the domain, range and the equation of all the asymptotes:

a) $y = \frac{1}{x}$ Domain: _____ Range: _____ Asymptotes _____	b) $y = \frac{1}{x+3}$ Domain: _____ Range: _____ Asymptotes _____	c) $y = \frac{1}{2x-3}$ Domain: _____ Range: _____ Asymptotes _____
d) $y = \frac{-1}{5-3x}$ Domain: _____ Range: _____ Asymptotes _____	e) $y = \frac{1}{x^2+5}$ Domain: _____ Range: _____ Asymptotes _____	f) $y = \frac{1}{x^2-4}$ Domain: _____ Range: _____ Asymptotes _____

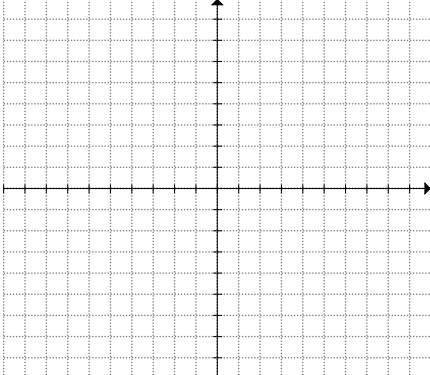
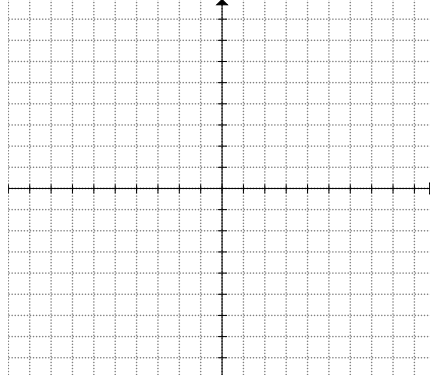
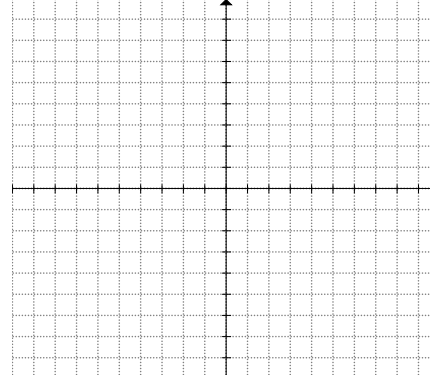
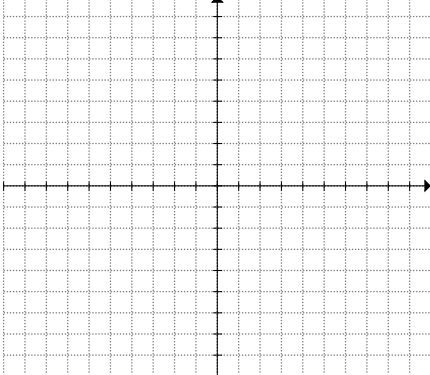
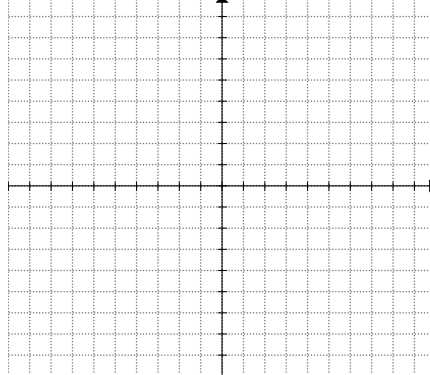
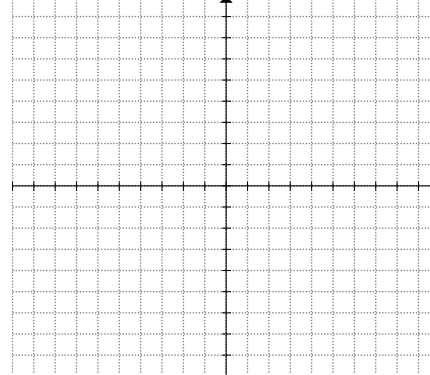
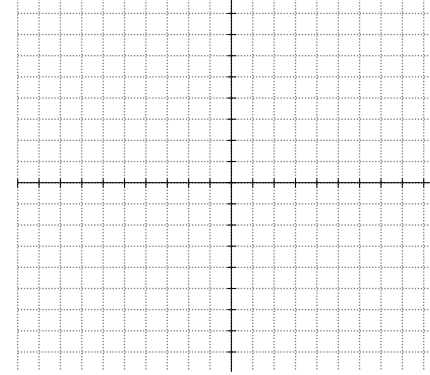
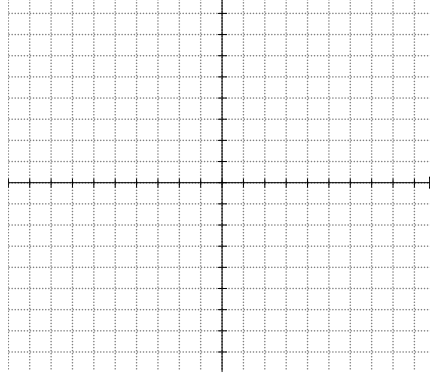
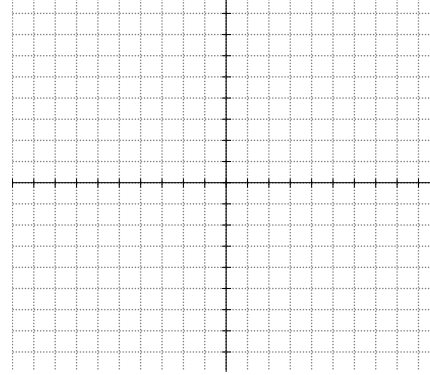
3. Given each of the following absolute value functions, indicate the domain, range, "x" and "y" intercepts.

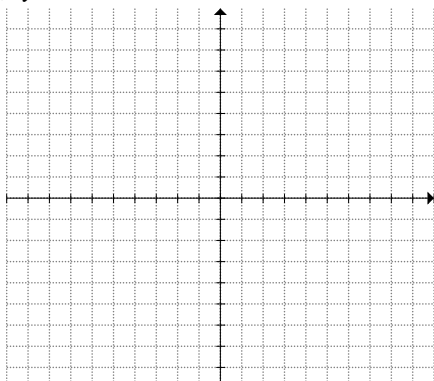
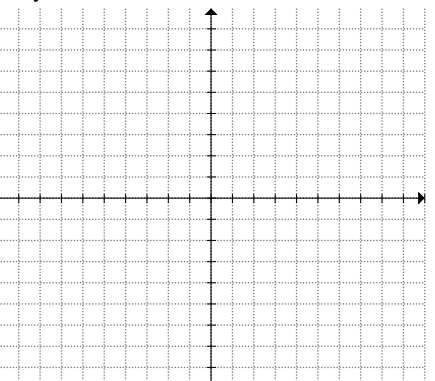
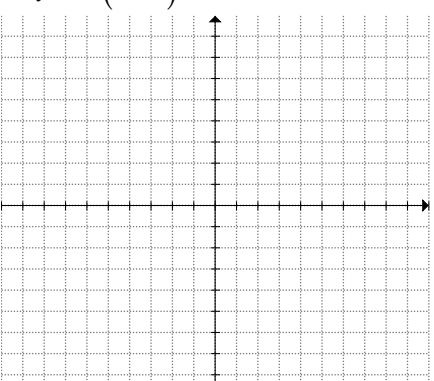
a) $y = 2x+1 $ Domain: _____ Range: _____ x-intercept _____ y-intercept _____	b) $y = 3x-5 $ Domain: _____ Range: _____ x-intercept _____ y-intercept _____	c) $y = - 3+4x $ Domain: _____ Range: _____ x-intercept _____ y-intercept _____
d) $y = - 5-2x $ Domain: _____ Range: _____ x-intercept _____ y-intercept _____	e) $y = x^2-9 $ Domain: _____ Range: _____ x-intercept _____ y-intercept _____	f) $y = x^2+1 $ Domain: _____ Range: _____ x-intercept _____ y-intercept _____

4. Given each of the following exponential functions, indicate the domain, range, and "y" intercepts.

a) $y = 2^{x+1}$ Domain: _____ Range: _____ y-intercept _____	b) $y = 4(3)^{x-1}$ Domain: _____ Range: _____ y-intercept _____	c) $y = -5(1.5)^{x-3}$ Domain: _____ Range: _____ y-intercept _____
d) $y = -7(2)^{2x-3} - 3$ Domain: _____ Range: _____ y-intercept _____	e) $y = 5^{x+1} + 19$ Domain: _____ Range: _____ y-intercept _____	f) $y = 10 - 5^{x+1}$ Domain: _____ Range: _____ y-intercept _____

5. Graph each of the following functions with the grid provided. State the Domain and Range, label any “x”, “y” intercepts and asymptotes.

<p>a) $y = \sqrt{x}$</p>  <p>Domain: Range:</p> <p>Intercepts</p>	<p>b) $y = \sqrt{3x-1}$</p>  <p>Domain: Range:</p> <p>Intercepts</p>	<p>c) $y = \sqrt{3x-4}$</p>  <p>Domain: Range:</p> <p>Intercepts</p>
<p>d) $y = x$</p>  <p>Domain: Range:</p> <p>Intercepts</p>	<p>e) $y = 5-6x$</p>  <p>Domain: Range:</p> <p>Intercepts</p>	<p>f) $y = 2x-5$</p>  <p>Domain: Range:</p> <p>Intercepts</p>
<p>g) $y = \frac{1}{x}$</p>  <p>Domain: Range:</p> <p>Asymptotes:</p> <p>Intercepts</p>	<p>h) $y = \frac{1}{2x-1}$</p>  <p>Domain: Range:</p> <p>Asymptotes:</p> <p>Intercepts</p>	<p>i) $y = \frac{1}{2x+3}$</p>  <p>Domain: Range:</p> <p>Asymptotes:</p> <p>Intercepts</p>

<p>j) $y = 2^x$</p>  <p>Domain: Range:</p> <p>Asymptotes:</p> <p>Intercepts</p>	<p>k) $y = 2^{x-1}$</p>  <p>Domain: Range:</p> <p>Asymptotes:</p> <p>Intercepts</p>	<p>l) $y = 3(2^{x+3})$</p>  <p>Domain: Range:</p> <p>Asymptotes:</p> <p>Intercepts</p>
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6. Solve the following equations algebraically:

<p>a) $\sqrt{2a-5} = 3$</p>	<p>b) $\sqrt{8x+5} = -4$</p>
<p>c) $x - \sqrt{x^2 + 15} = -3$</p>	<p>d) $27^{3x-1} = 9^{5x-\frac{7}{3}}$</p>
<p>e) $8^{2x} = 16^{3x-1}$</p>	<p>f) $3 3x+4 = 7$</p>
<p>g) $5x-7 = x-3$</p>	<p>h) $\frac{ 2x-1 }{x-3} = 3$</p>

i) $10 = x^2 - 6 $	k) $12 = x^2 + 3 $
l) $ x^2 - 10x = 24$	m) $ 13x - x^2 = 30$
n) $ x^2 - 3x = 4$	o) $\left \frac{x+2}{3x-1} \right = 5$

7. If the smallest value of “y” satisfying the equation $y = 3x^2 + 6x + k$ is 4, find the value of “k”?

8. Find all (x, y) such that:

i) $\frac{x}{2} + 3y = 4$
 $x + 6y = 9$

ii) $2\sqrt{x} + 4\sqrt{y} = 10$
 $2\sqrt{x} - 3\sqrt{y} = 3$

9. Solve for "c" in terms of "a" and "b" given that: $\sqrt{a + \frac{b}{c}} = a\sqrt{\frac{b}{c}}$

10. Pipe A can fill a pool in 5 hours, while pipe B can fill it in four. How long will it take for the two to fill the pool if both are operating at the same time?

11. Tim and Hank paint a fence for four hours, after which Jack helps them and they finish two hours later. If Jack had not helped them, it would have taken them five more hours to paint the fence. How long would it take for Tim to paint the fence alone?

12. If $\sqrt{4+x} + \sqrt{10-x} = 6$, what is the value of $\sqrt{(4+x)(10-x)}$?

13. If both "a" and "b" are positive integers, the equation $\sqrt{10} = \sqrt{a} + \sqrt{b}$ has no solutions. For how many positive integral values of $x \leq 1000$ does the equation have at least one solution in positive integers?

$$\sqrt{x} = \sqrt{a} + \sqrt{b}$$

If $\sqrt{4+x} + \sqrt{10-x} = 6$, what is the value of $\sqrt{(4+x)(10-x)}$?

4-6. If both a and b are positive integers, the equation $\sqrt{10} = \sqrt{a} + \sqrt{b}$ has no solutions. For how many positive integral values of $x \leq 1000$ does

$$\sqrt{x} = \sqrt{a} + \sqrt{b}$$

have at least one solution in positive integers?

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EXAMPLE 3-14 Pipe A can fill a pool in 5 hours, while pipe B can fill it in four. How long will it take for the two to fill the pool if both are operating at the same time?

EXAMPLE 3-15 Tom and Huck paint a fence for four hours, after which Jim helps them and they finish two hours later. If Jim had not helped them, it would have taken them 5 more hours to paint the fence. How long would it take for Jim to paint the fence alone?

37. Solve for c in terms of a and b given that

$$\sqrt{a + \frac{b}{c}} = a \sqrt{\frac{b}{c}}.$$

(AHSME 1955)

$$2\sqrt{x} + 4\sqrt{y} = 10$$

$$2\sqrt{x} - 3\sqrt{y} = 3.$$

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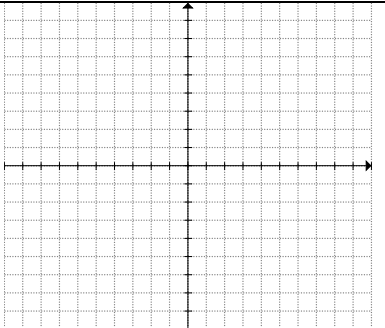
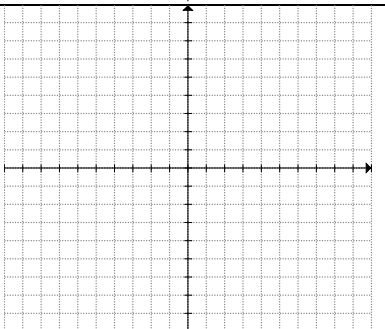
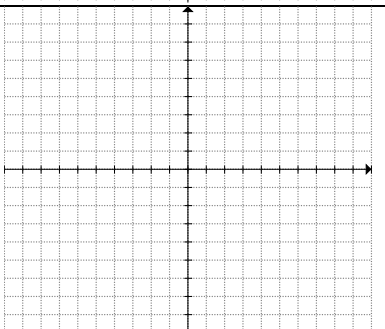
426. If the smallest value of y satisfying the equation $y = 3x^2 + 6x + k$ is 4, find the value of k .

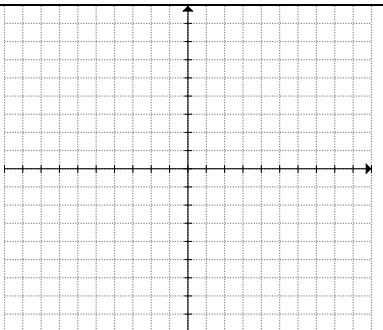
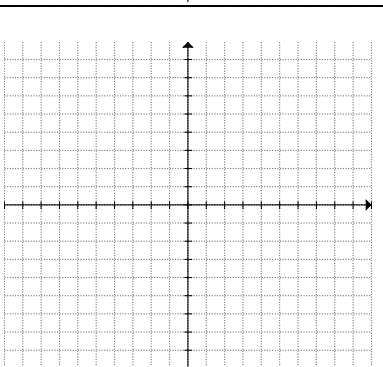
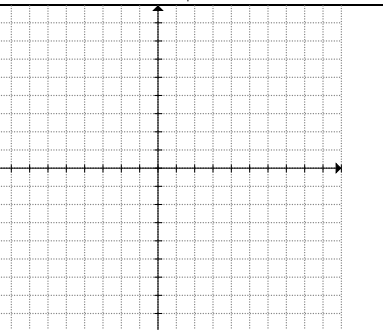
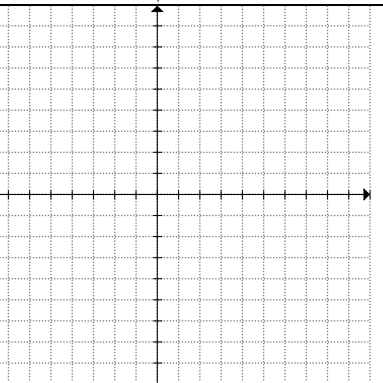
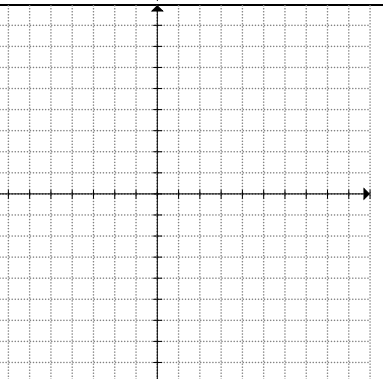
17. (MATHCOUNTS 1989)

18.

19.

Solve the following equations algebraically for “ x ”. Then use the grid of the left to graph the two sides of the equations as Y1 and Y2 with a graphing calculator. Solve for “ x ” graphically by finding the points of intersections. Indicate all the extraneous roots

a) $ 3x+1 =5$	
b) $ 2x+1 =2x$	
c) $ 4x+10 =x+1$	

<p>d) $\sqrt{3x+10} = -2$</p>	
<p>e) $\sqrt{x-5} = -x-5$</p>	
<p>f) $4x+2 = 3+x$</p>	
<p>g) $3-x = 3-x$</p>	
<p>h) $x-6 = 6-x$</p>	

i) $\frac{1}{x} = x$	
j) $\frac{1}{2x+1} = 2x+3$	

20. Solve each of the following equations algebraically. Indicate all extraneous roots:

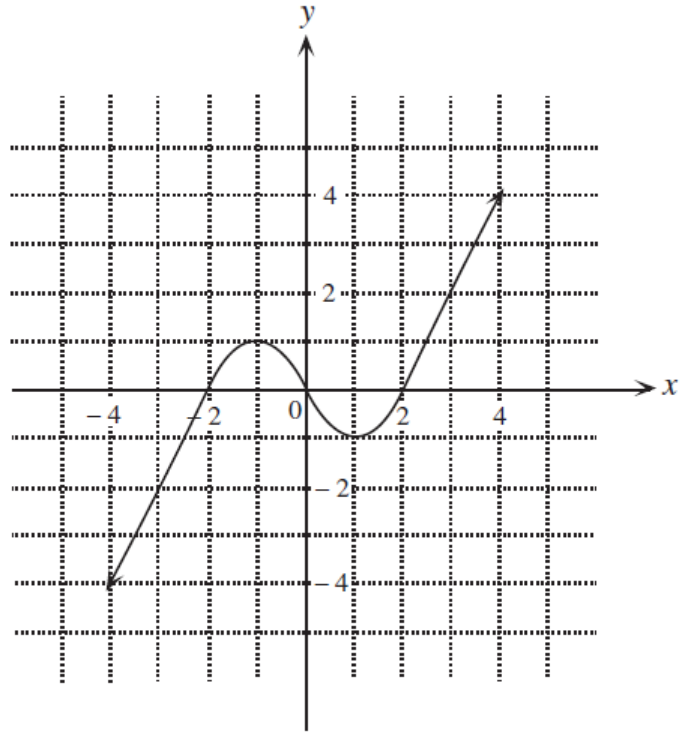
a) $ x^2 - 15x = 54$	b) $\sqrt{3x+10} - \sqrt{5x} = 0$
c) $ x^2 - 10x = 24$	d) $\sqrt{4-x} + \sqrt{x-9} = \sqrt{x-14}$
e) $\sqrt{5x^2 - 2x} = 4$	f) $\sqrt{3x+8} = 3\sqrt{x} - 2\sqrt{2}$

g) $\sqrt{x-2} = \sqrt{3x+4}$	h) $2 + \sqrt{x-5} = \sqrt{2x-3}$
i) $\frac{2}{\sqrt{x+1}} = \sqrt{x} + \sqrt{x+1}$	j) $\frac{3}{\sqrt{x}} - 5 = \frac{1-2\sqrt{x}}{\sqrt{x}}$

8. The graph of the function $y = g(x)$ is shown.

Determine the number of solutions of the equation

$$|g(x) - 1| = \frac{1}{2}.$$

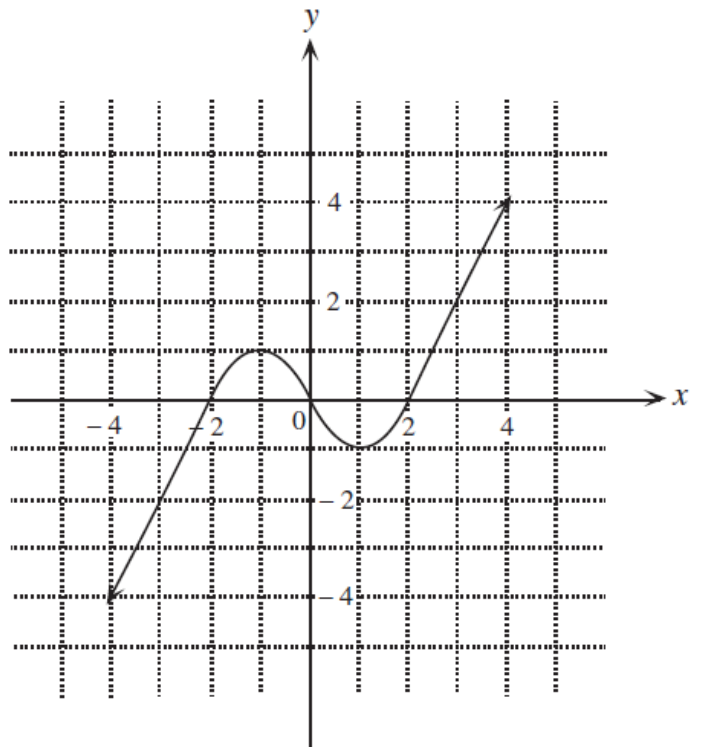


Contest	Year	Number	Answer

8. The graph of the function $y = g(x)$ is shown.

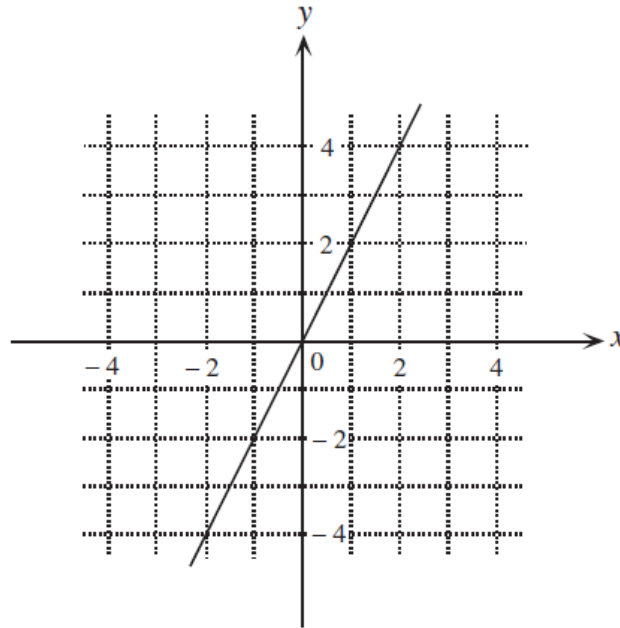
Determine the number of solutions of the equation

$$\left| |g(x)| - 1 \right| = \frac{1}{2}.$$





(b) The graph of $y = f(x)$, where $f(x) = 2x$, is given on the grid below.



- (i) On the grid in the answer booklet, draw and label the graphs of the inverse function $y = f^{-1}(x)$ and the reciprocal function $y = \frac{1}{f(x)}$.
- (ii) State the coordinates of the points where $f^{-1}(x) = \frac{1}{f(x)}$.
- (iii) Determine the numerical value of $f^{-1}\left(\frac{1}{f\left(\frac{1}{2}\right)}\right)$.

21. What are all values of "x" that satisfy the equation: $\sqrt{x^2 - 3x + 2} < x + 3$?

22. When given a function in the form of $y = \sqrt{x - a} + b$, what happens to the graph of $y = \sqrt{x}$ for each of the following:

a) $a = 4$ and $b = -2$	b) $a = -3$ and $b = 7$	c) $a = 5$ and $b = 10$
d) $a = -10$ and $b = -2$	e) $a = 12$ and $b = 3$	f) $a = 5$ and $b = -11$

23. Point "Z" lies on the x-axis. The coordinates of "A" and "B" are $(0, 6)$ and $(0, -15)$ respectively. The sum of the distances ZA and ZB is 27 units long. Determine all the possible coordinates of "Z".