1. Find an equation of the line that passes through the points $A(4,-2)$ and $B(-3,7)$.

1) $y=-\frac{9}{7}x+6$
2) $y=-\frac{9}{7}x+\frac{22}{7}$
3) $y=-\frac{9}{7}x+\frac{10}{7}$
4) $y=\frac{9}{7}x-12$
5) $y=\frac{9}{7}x+\frac{46}{7}$
6) $y=\frac{9}{7}x-\frac{50}{7}$
7) $y=-\frac{7}{9}x+\frac{7}{3}$
8) $y=-\frac{7}{9}x+\frac{22}{9}$
9) $y=-\frac{7}{9}x+\frac{10}{9}$

2. Find an equation of the circle that is tangent to the line $x=5$ and whose center is at $(-4,3)$.

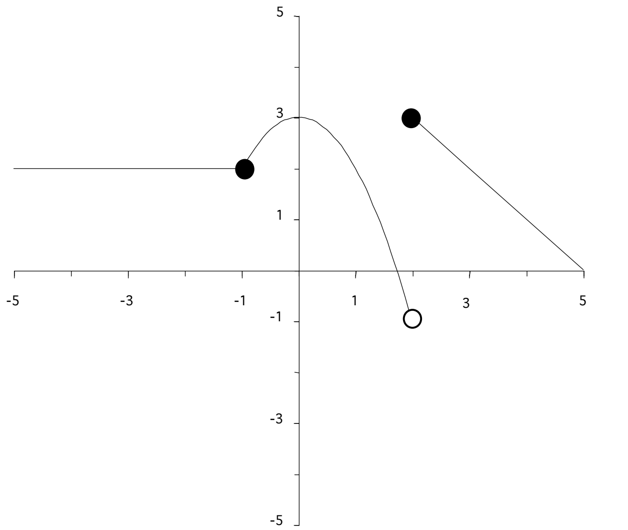
1) $(x-4)^2+(y+3)^2=81$
2) $(x-4)^2+(y+3)^2=9$
3) $(x-4)^2+(y+3)^2=4$
4) $(x-4)^2+(y+3)^2=2$
5) $(x-3)^2+(y+4)^2=81$
6) $(x-3)^2+(y+4)^2=9$
7) $(x-3)^2+(y+4)^2=4$
8) $(x-3)^2+(y+4)^2=2$
9) None of the above

3. Write the expression in the form *a* + *bi*, where *a* and *b* are real numbers.

$i(3-4i)^2$

1) $24-7i$
2) $24+25i$
3) $-24-7i$
4) $-24+25i$
5) $-7+24i$
6) $25+24i$
7) $-7-24i$
8) $25-24i$
9) None of the above

4. The graph of a piecewise-defined function $\boldsymbol{f}$ is shown below. Find $\boldsymbol{f}$.



1) $f(x)=\begin{cases} -1 & \text{if } x<-1 \\ -x^2+3 & \text{if } -1\le x<2 \\ -x+5 & \text{if } x\ge 2 \end{cases}$

2) $f(x)=\begin{cases} -1 & \text{if } x<-1 \\ -x^3+3 & \text{if } -1\le x<2 \\ -x+3 & \text{if } x\ge 2 \end{cases}$

3) $f(x)=\begin{cases} -1 & \text{if } x<-1 \\ -x^2+3 & \text{if } -1\le x<2 \\ -x+3 & \text{if } x\ge 2 \end{cases}$

4) $f(x)=\begin{cases} -1 & \text{if } x<-1 \\ -x^3+3 & \text{if } -1\le x<2 \\ -x+5 & \text{if } x\ge 2 \end{cases}$

5) $f(x)=\begin{cases} 2 & \text{if } x<-1 \\ -x^2+3 & \text{if } -1\le x<2 \\ -x+5 & \text{if } x\ge 2 \end{cases}$

6) $f(x)=\begin{cases} 2 & \text{if } x<-1 \\ -x^3+3 & \text{if } -1\le x<2 \\ -x+3 & \text{if } x\ge 2 \end{cases}$

7) $f(x)=\begin{cases} 2 & \text{if } x<-1 \\ -x^2+3 & \text{if } -1\le x<2 \\ -x+3 & \text{if } x\ge 2 \end{cases}$

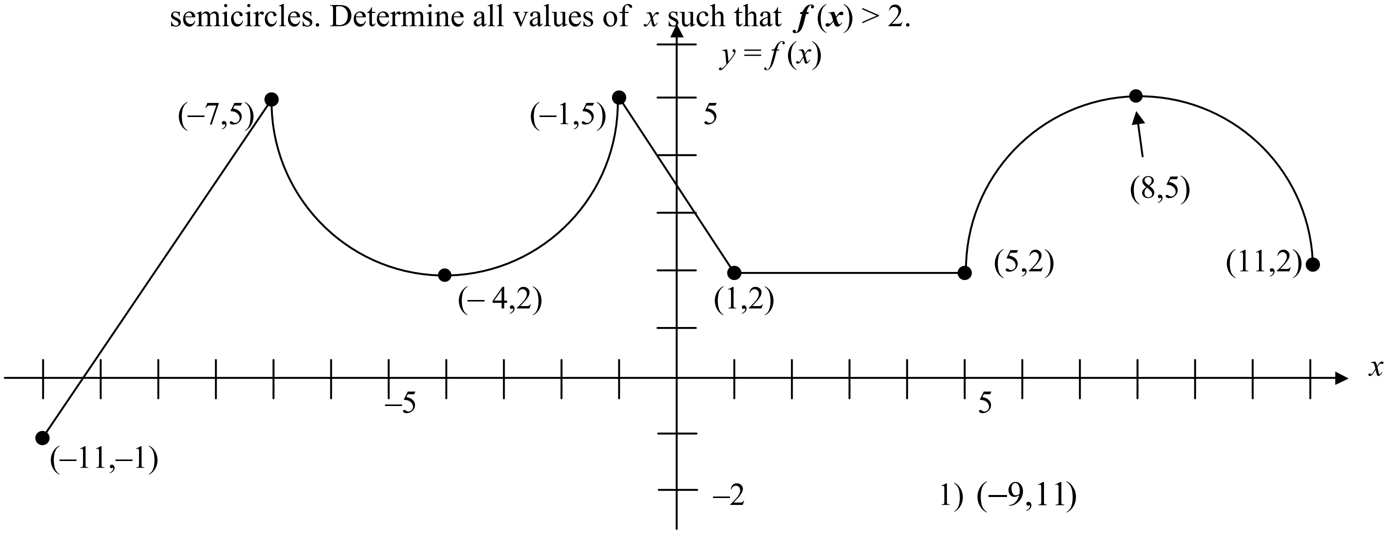
8) $f(x)=\begin{cases} 2 & \text{if } x<-1 \\ -x^3+3 & \text{if } -1\le x<2 \\ -x+5 & \text{if } x\ge 2 \end{cases}$

9) None of the above

5. Given $f(x)=-x^2-2x+4$ and $g(x)=|x-7|$, find $(f\circ g)(5)$.

1) -164
2) -116
3) 4
4) 8
5) 12
6) 18
7) 38
8) 124
9) None of the above

6. The graph of a function, $\boldsymbol{y = f(x)}$, is shown. The graph consists of three line segments and two semicircles. Determine all values of x such that $\boldsymbol{f(x)} > 2$.



1) $(-9,11)$
2) $(-9,1)\cup(5,11)$
3) $(-9,-4)\cup(-4,1)\cup(5,11)$
4) $(-11,-7)\cup(-4,-1)\cup(5,8)$
5) $(-7,-4)\cup(-1,1)\cup(8,11)$
6) $(1,5)$
7) $\{-4\}\cup(1,5)$
8) $\{-4\}\cup(1,5)\cup\{8\}$
9) None of the above

7. Find the intervals where the function is increasing.
$$f(x)=\left|\,|x|-4\,\right|$$

1) $(-\infty,0]$
2) $[-4,4]$
3) $[0,4]$
4) $[0,\infty)$
5) $[4,\infty)$
6) $(-\infty,0]\cup[4,\infty)$
7) $[-4,0]\cup[4,\infty)$
8) $(-\infty,-4]\cup[4,\infty)$
9) $(-\infty,-4]\cup[0,4]$

8. A large doorway has the shape of a parabolic arch. The doorway is 16 feet high at the center and is 8 feet wide at the base. At height 10 feet above the floor, how wide is the arch?
(Hint: Draw an accurate picture of the given information).

1) $2\sqrt{2}$ feet
2) $2\sqrt{3}$ feet
3) $2\sqrt{5}$ feet
4) $2\sqrt{6}$ feet
5) $2\sqrt{7}$ feet
6) $2\sqrt{10}$ feet
7) $2\sqrt{11}$ feet
8) $2\sqrt{13}$ feet
9) None of the above

9. A shipping company is trying to decide which of two vans to purchase. Van A costs $30,000 and will likely require maintenance costs of $360 per month and insurance will cost $280 per month. Van B costs $34,800 and will likely require maintenance costs of $210 per month and insurance will cost $310 per month. For how many months must Van B be used before it becomes more economical than Van A? Choose the best answer from the following choices.

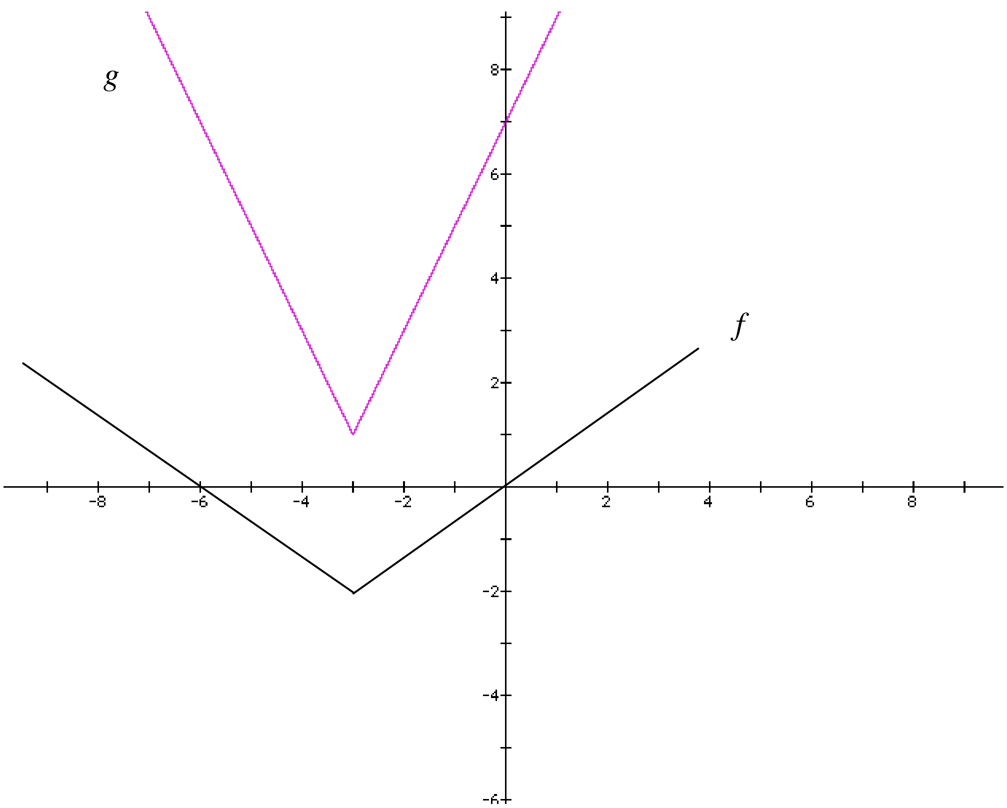
1) more than 10 months
2) more than 15 months
3) more than 20 months
4) more than 25 months
5) more than 30 months
6) more than 35 months
7) more than 40 months
8) more than 45 months
9) more than 50 months

10. Find the x-intercepts and y-intercepts of the equation.

$$x^2 + y^2 + 10x - 8y + 18 = 0$$

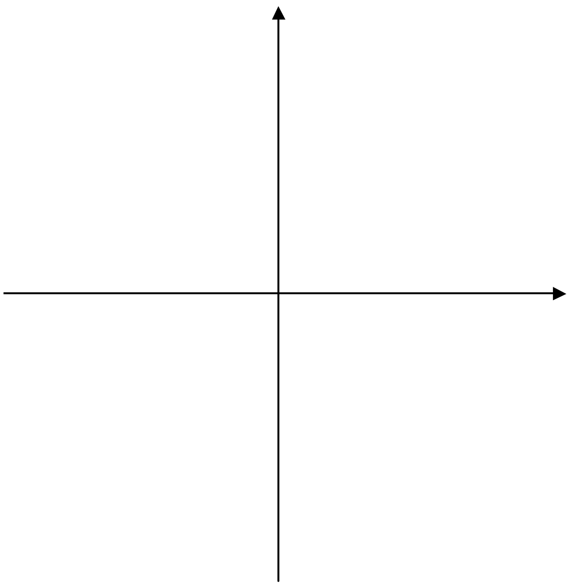
1) $(-5+\sqrt{7},0), (-5-\sqrt{7},0)$, no y - intercepts
2) $(-5+\sqrt{7},0), (-5-\sqrt{7},0), (0,4+\sqrt{2})$ and $(0,4-\sqrt{2})$
3) $(-5+\sqrt{7},0), (-5-\sqrt{7},0)$, and $(0,4)$
4) $(-3,0), (-6,0)$, no y - intercepts
5) $(-3,0), (-6,0), (0,4+\sqrt{2})$ and $(0,4-\sqrt{2})$
6) no x - intercepts, $(0,4+\sqrt{2})$ and $(0,4-\sqrt{2})$
7) no x - intercepts, $(0,4)$
8) no x - intercepts, no y - intercepts
9) None of the above

11. The graph of a function $\boldsymbol{f}$ is shown below. Use properties of symmetry, shifts, compressions, stretches, and/or reflections, to find an equation for the graph of $\boldsymbol{g}$ in terms of $\boldsymbol{f}$.



1) $g(x) = \frac{1}{3} f(x) + 3$
2) $g(x) = \frac{1}{3} f(x) + 7$
3) $g(x) = \frac{1}{2} f(x) + 3$
4) $g(x) = \frac{1}{2} f(x) + 7$
5) $g(x) = \frac{3}{2} f(x) + 3$
6) $g(x) = \frac{3}{2} f(x) + 7$
7) $g(x) = 2 f(x) + 3$
8) $g(x) = 2 f(x) + 7$
9) None of the above

12. Find the standard equation of the parabola that has a vertical axis, vertex$(2,-3)$ and passes through the point $(4, 5)$.



1) $y=\frac{1}{18}(x+2)^2+3$
2) $y=\frac{1}{49}(x+2)^2+3$
3) $y=\frac{1}{2}(x-2)^2+3$
4) $y=\frac{1}{9}(x-2)^2+3$
5) $y=\frac{2}{9}(x+2)^2-3$
6) $y=\frac{1}{7}(x+2)^2-3$
7) $y=2(x-2)^2-3$
8) $y=\frac{7}{9}(x-2)^2-3$
9) None of the above

13. Solve the inequality.

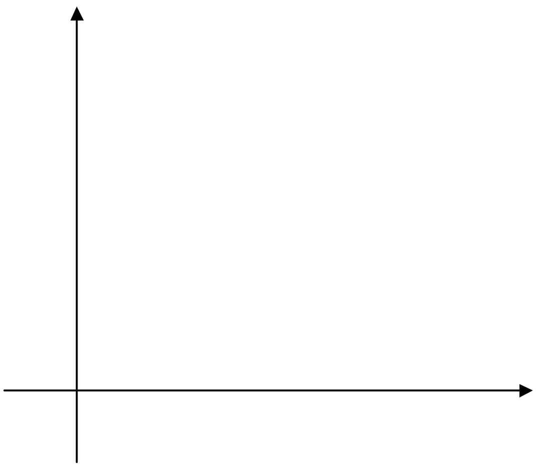
$$\frac{3x}{x-5}>2$$

1) $(-\infty,-10)\cup(5,\infty)$
2) $(-\infty,-10)\cup(-5,\infty)$
3) $(-\infty,-5)\cup(5,\infty)$
4) $(-\infty,-10)$
5) $(-\infty,-5)$
6) $(-\infty,5)$
7) $(-10,\infty)$
8) $(-5,\infty)$
9) $(5,\infty)$

14. Let triangle ABC have vertices on the *xy*-coordinate plane A(0, 0), B(b, 0), and C(c, h). Find an equation for the distance between the midpoint of AB and the midpoint of BC.

Assume b, c, and h are all positive **and** assume $b > c$.

(Hint: Draw an accurate graph of the given information).



1) $d = \sqrt{\left(\frac{b+c}{2} - 0\right)^2 + \left(\frac{h}{2} - 0\right)^2}$

2) $d = \sqrt{\left(\frac{b+c}{2} - \frac{c}{2}\right)^2 + \left(\frac{h}{2} - \frac{h}{2}\right)^2}$

3) $d = \sqrt{\left(\frac{b+c}{2} - \frac{b}{2}\right)^2 + \left(\frac{h}{2} - 0\right)^2}$

4) $d = \sqrt{\left(\frac{b}{2} - 0\right)^2 + (0-0)^2}$

5) $d = \sqrt{\left(\frac{b}{2} - c\right)^2 + (0-h)^2}$

6) $d = \sqrt{\left(\frac{b}{2} - \frac{c}{2}\right)^2 + \left(0 - \frac{h}{2}\right)^2}$

7) $d = \sqrt{\left(\frac{c}{2} - b\right)^2 + \left(\frac{h}{2} - 0\right)^2}$

8) $d = \sqrt{(c-0)^2 + (h-0)^2}$

9) $d = \sqrt{(c-b)^2 + (h-0)^2}$

15. Solve the inequality.

$$-2 \le 3 + \tfrac{1}{4}x < 5$$

1) $(-\infty, -20] \cup (8, \infty)$

2) $(-\infty, 4] \cup (8, \infty)$

3) $[-20, \infty)$

4) $[4, \infty)$

5) $(8, \infty)$

6) $[-20, 8)$

7) $[4, 8)$

8) $(-\infty, -20]$

9) $(-\infty, 8)$

16. Consider $f(x)=\dfrac{x+5}{3x}$. Find $\dfrac{f(x)-f(a)}{x-a}$, given that a is real number and $x\neq a$.

1) 0

2) 1

3) $\dfrac{5(a-x)}{3ax}$

4) $-\dfrac{5(a-x)}{3ax}$

5) $\dfrac{5a+2ax+5x}{3ax(x-a)}$

6) $-\dfrac{5a+2ax+5x}{3ax(x-a)}$

7) $\dfrac{5}{3ax}$

8) $-\dfrac{5}{3ax}$

9) None of the above

17. The amount of heat H (in joules) required to convert one gram of a liquid into vapor is linearly related to the temperature T (in °F) of the atmosphere. At 100 °F this conversion takes 400 joules, and each increase of temperature of 5° F lowers the amount of heat needed by 15 joules. Express H in terms of T.

1) $H=\frac{1}{3}T+\frac{1100}{3}$

2) $H=\frac{1}{3}T-\frac{100}{3}$

3) $H=-\frac{1}{3}T+\frac{1300}{3}$

4) $H=-\frac{1}{3}T+\frac{700}{3}$

5) $H=3T+100$

6) $H=3T-1100$

7) $H=-3T+1300$

8) $H=-3T+700$

9) None of the above

18. Consider $g(x)=\frac{2}{x^2+1}$. Find $\sqrt{g(a)}$, given that a is a positive real number. Simplify your answer.

1) $\frac{2}{a^2+1}$
2) $\frac{\sqrt{2}}{a^2+1}$
3) $\frac{\sqrt{2a^2+2}}{a^2+1}$
4) $\frac{2a^2+2}{a^2+1}$
5) $\frac{2a+2}{a^2+1}$
6) $\frac{2}{a+1}$
7) $\frac{\sqrt{2}}{a+1}$
8) $\frac{\sqrt{2a^2+2}}{a+1}$
9) $\frac{2a+2}{a+1}$

19. Find all the points of the form $(a,2a)$ that are a distance of $\sqrt{160}$ from the point $P(-7,6)$.

1) $(-5,-10)$ and $(3,6)$
2) $(3,6)$
3) $(\sqrt{15},2\sqrt{15})$ and $(-\sqrt{15},-2\sqrt{15})$
4) $(\sqrt{15},2\sqrt{15})$
5) $(\frac{19}{3},\frac{38}{3})$ and $(3,6)$
6) $(5,10)$ and $(-3,-6)$
7) $(53,106)$
8) $(13,26)$
9) None of the above