Section 2.1

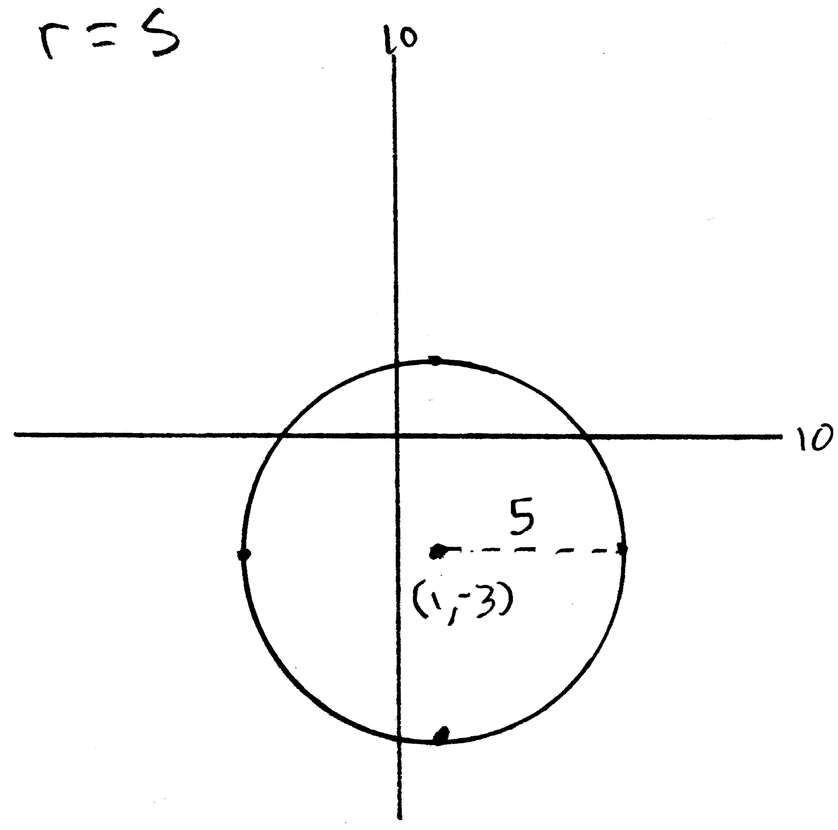
96. $x^2+y^2-2x+6y-15=0$

$(x^2-2x+1)+(y^2+6y+9)-15-1-9=0$

$(x-1)^2+(y+3)^2=25=5^2$

$c(1,-3)$

$r=5$



100. $4x^2+4y^2-4x+2y-1=0$

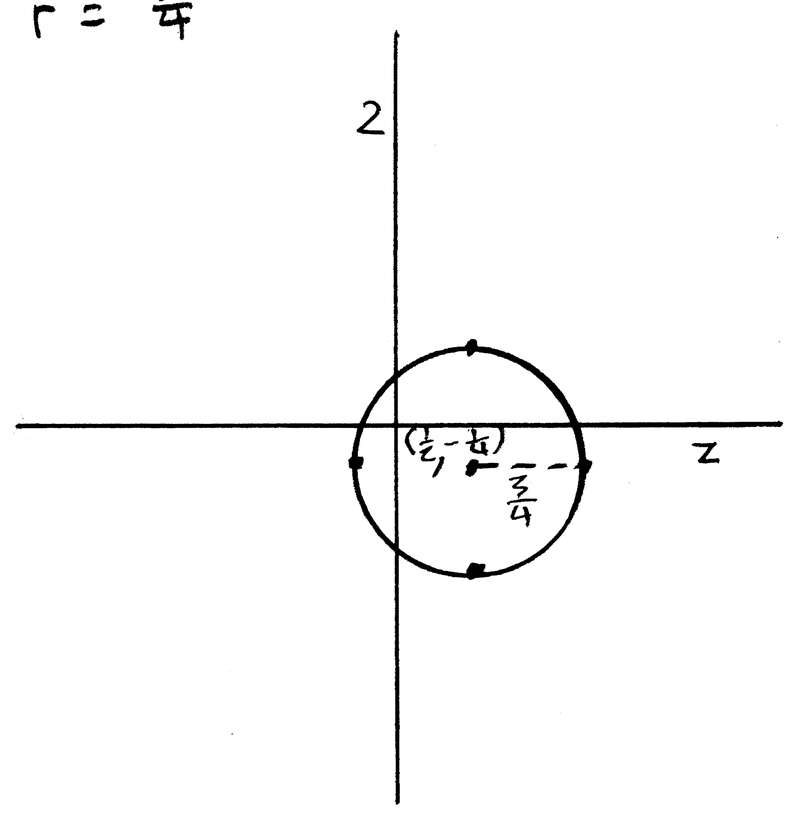
$x^2+y^2-x+\frac{1}{2}y-\frac{1}{4}=0$

$(x^2-x+\frac{1}{4})+(y^2+\frac{1}{2}y+\frac{1}{16})-\frac{1}{4}-\frac{1}{4}-\frac{1}{16}=0$

$(x-\frac{1}{2})^2+(y+\frac{1}{4})^2=\frac{9}{16}=(\frac{3}{4})^2$

$c(\frac{1}{2},-\frac{1}{4})$

$r=\frac{3}{4}$



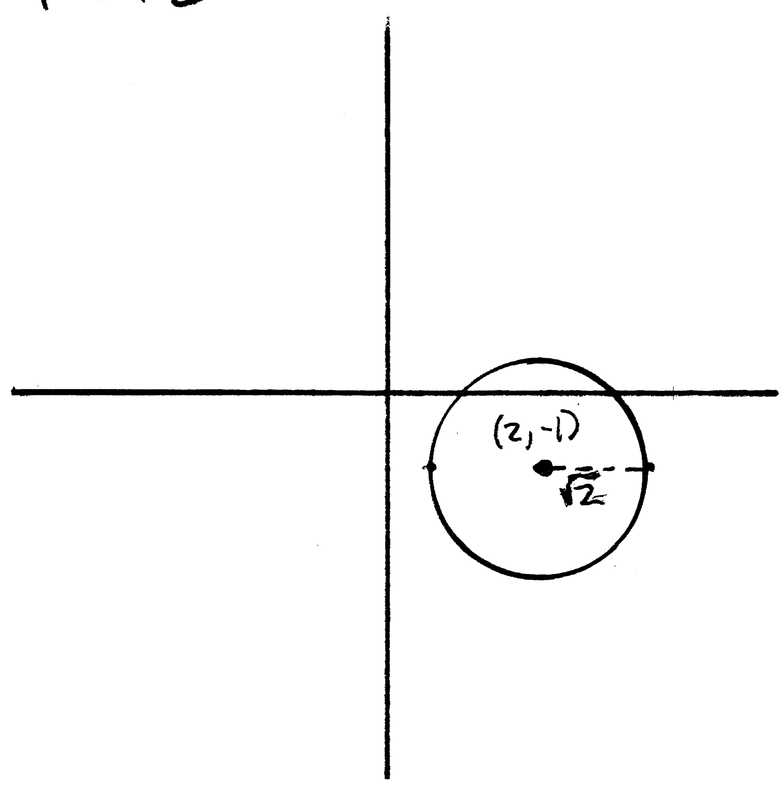
102. $x^2+y^2-4x+2y+3=0$

$(x^2-4x+4)+(y^2+2y+1)+3-4-1=0$

$(x-2)^2+(y+1)^2=2=(\sqrt{2})^2$

$C(2,-1)$

$r=\sqrt{2}$



Section 2.5

2. $f(x) = \sqrt{x^2-4}$, $x = -2$
$D = (-\infty, -2] \cup [2, \infty)$
$R = [0, \infty)$
$f(-2) = \sqrt{(-2)^2-4} = \sqrt{4-4} = \sqrt{0} = 0$

4. $f(x) = |x-2|$, $x = 2$
$D = \mathbb{R}$
$R = [0, \infty)$
$f(2) = |2-2| = |0| = 0$

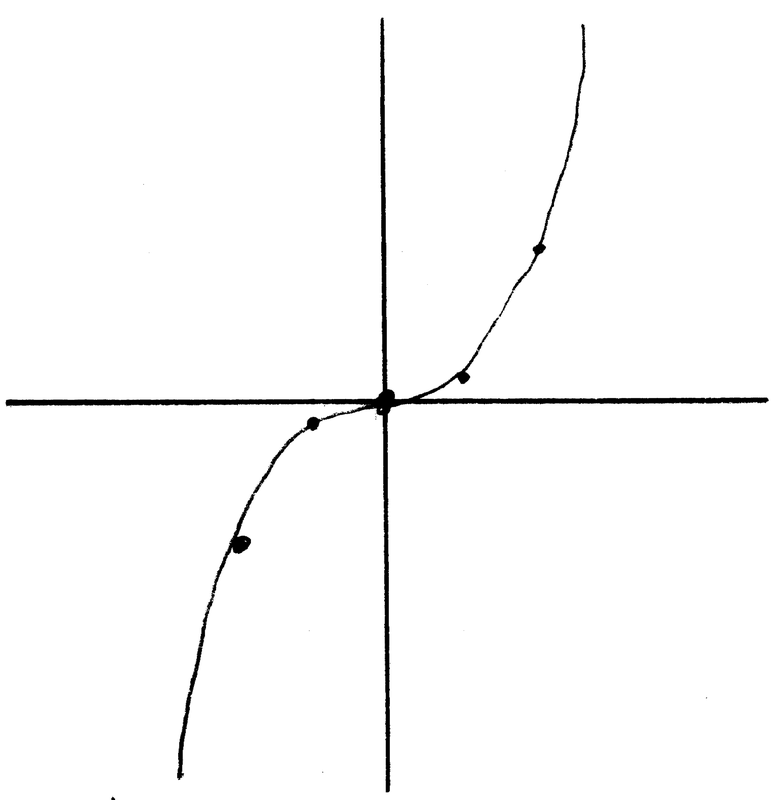
6. $f(x) = \frac{|x|}{x}$, $x = 5$
$D = \mathbb{R} - \{0\}$
$R = \{-1, 1\}$
$f(5) = \frac{|5|}{5} = \frac{5}{5} = 1$

8. $f(x) = \sqrt{x^2-9}$, $x = 3$
$D = (-\infty, -3) \cup (3, \infty)$
$R = [0, \infty)$
$f(3) = \sqrt{3^2-9} = \sqrt{9-9} = \sqrt{0} = 0$

10. Function

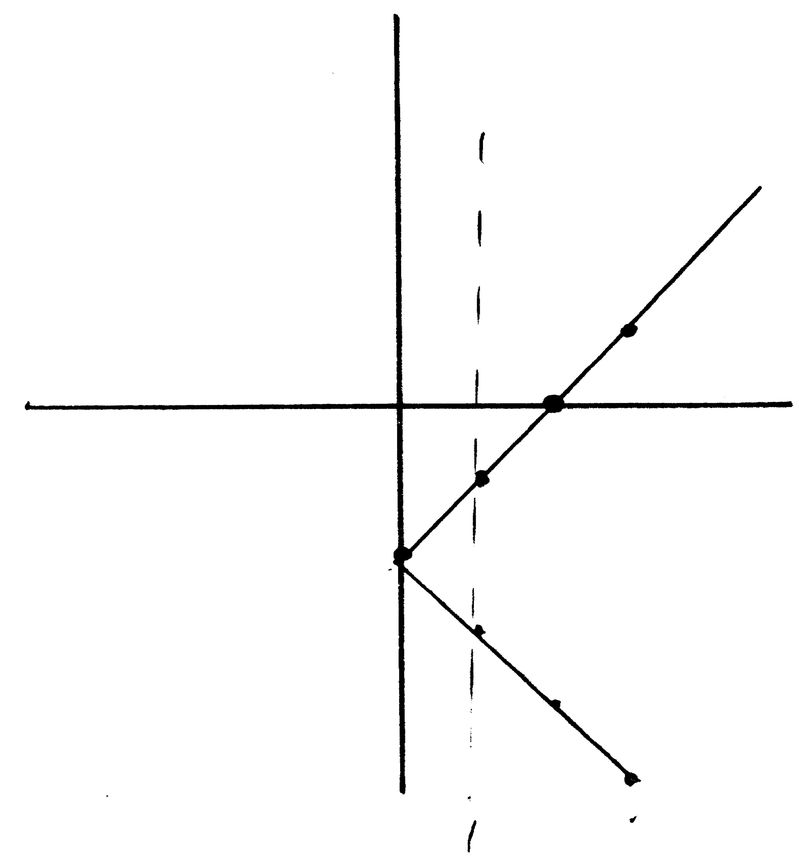
12. Not a Function

14. $y = \frac{1}{2}x^3$



Function.

16. $x = |y+2|$



Not a function.

18. $f(x) = x^2 - 2x$

$(-\infty, 1)$ decreasing
$(1, \infty)$ increasing

20. $f(x) = \sqrt{x^2-4}$

$(-\infty, -2)$ decreasing
$(2, \infty)$ increasing

22. $f(x) = x^{2/3}$

$(-\infty, 0)$ decreasing
$(0, \infty)$ increasing

24. $y = |x+1| + |x-1|$

$(-\infty, -1)$ decreasing
$(-1, 1)$ constant
$(1, \infty)$ increasing

40. $f(t) = t^2 + 3t - 10$

$f(-t) = (-t)^2 + 3(-t) - 10$
$= t^2 - 3t - 10$

no

42 $h(x) = x^3 + 3$

$h(-x) = (-x)^3 + 3$
$= -x^3 + 3$

no

44 $g(s) = 4s^{2/3}$

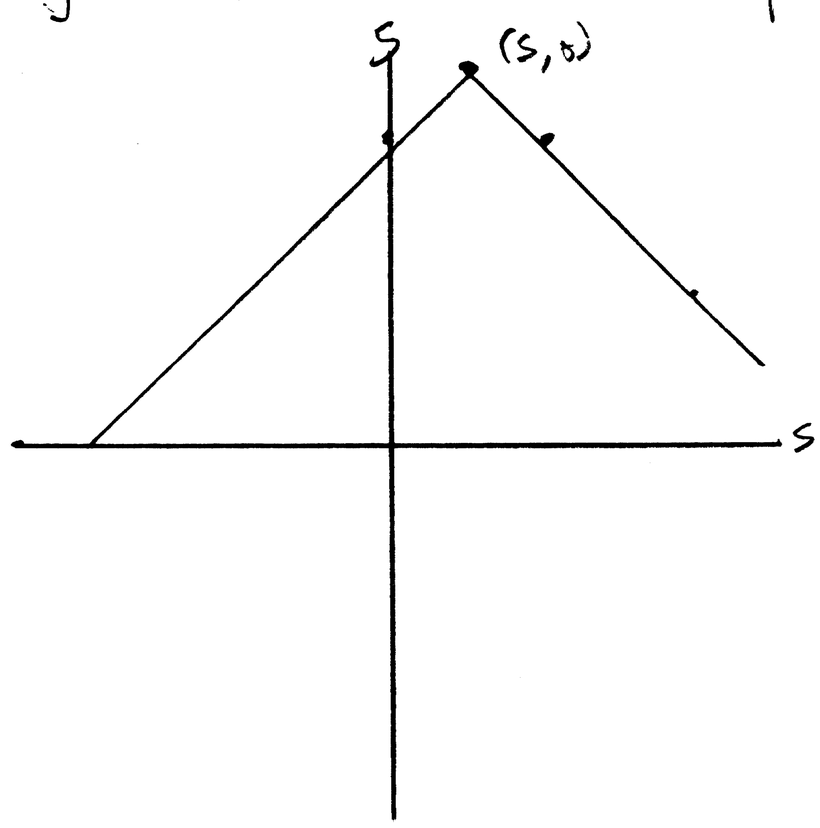
$g(-s) = 4(-s)^{2/3}$
$= 4s^{2/3}$

even.

Section 2.6

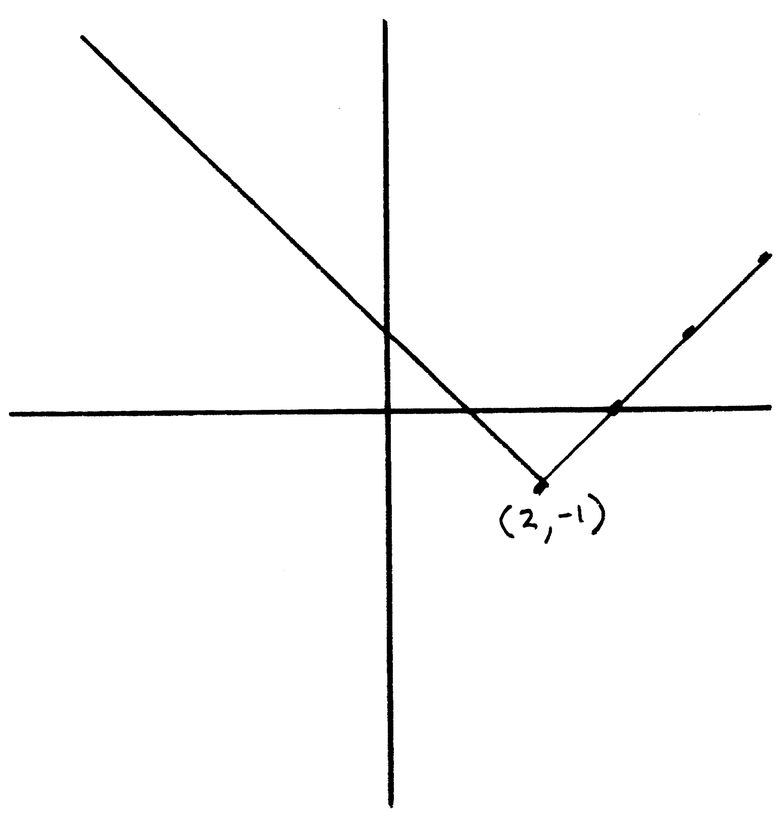
14. $g(x) = 5 - |x-1|$

$g_0(x) = |x|$
$g_1(x) = |x-1|$ translate right 1
$g_2(x) = -|x-1|$ reflect x
$g(x) = 5 - |x-1|$ translate up 5



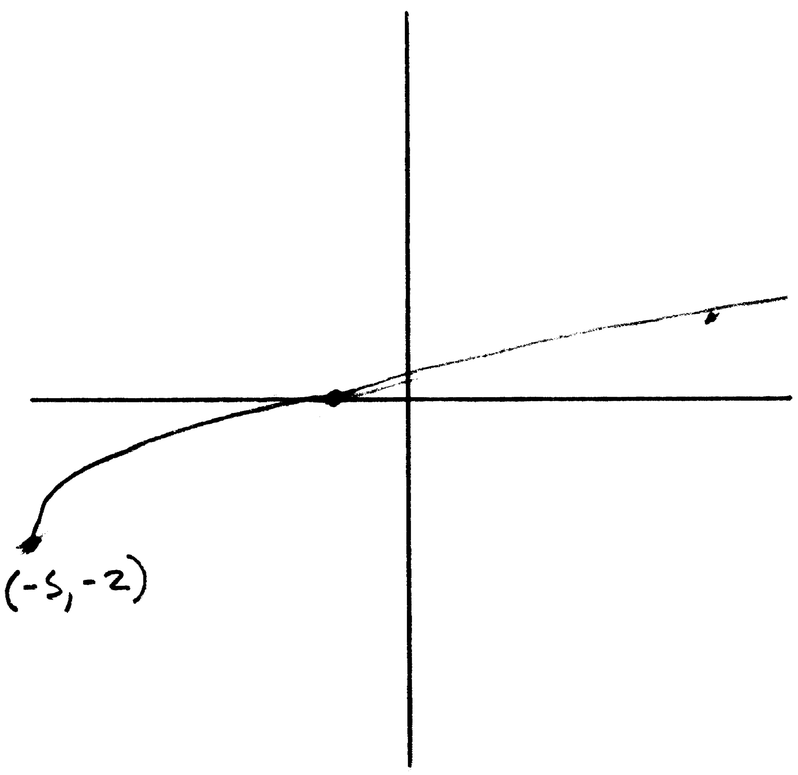
16. $g(x) = |x-2| - 1$

$g_0(x) = |x|$
$g_1(x) = |x-2|$ translate right 2
$g(x) = |x-2| - 1$ translate down 1



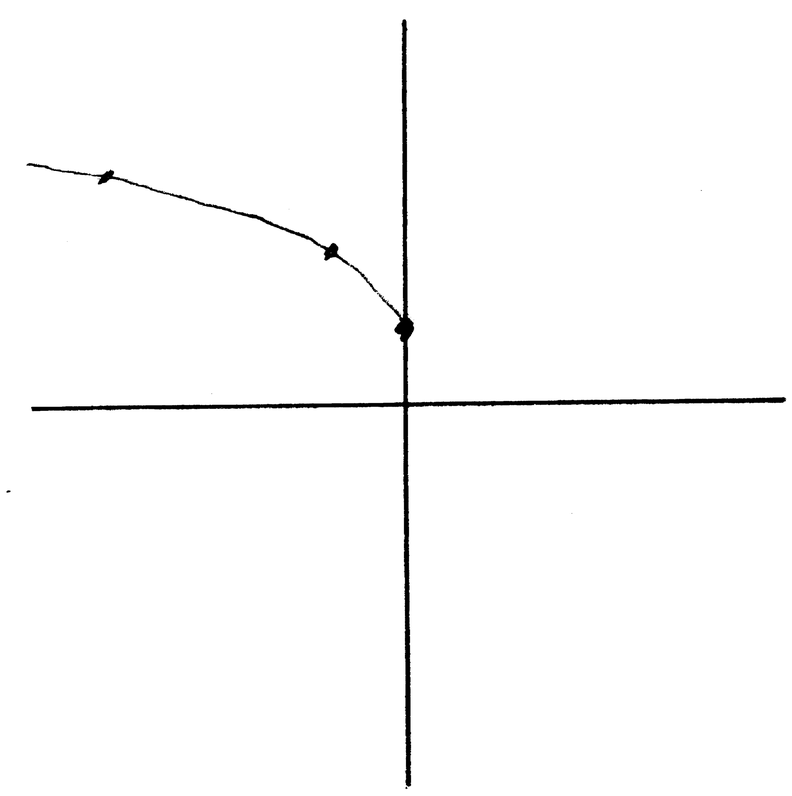
20. $g(x) = \sqrt{x+5} - 2$

$g_0(x) = \sqrt{x}$
$g_1(x) = \sqrt{x+5}$ translate left 5
$g(x) = \sqrt{x+5} - 2$ translate down 2



24. $g(x) = \sqrt{-x} + 1$

$g_0(x) = \sqrt{x}$
$g_1(x) = \sqrt{-x}$ reflect y
$g(x) = \sqrt{-x} + 1$ translate up 1



35. $f_0(x) = x^3$
$f(x) = (x-2)^3$

36. $f_0(x) = x$
$f_1(x) = \frac{1}{2}x$

37. $f_0(x) = x^2$
$f_1(x) = -x^2$

38. $f_0(x) = 0$
$f(x) = 7$

39. $f_0(x) = \sqrt{x}$
$f_1(x) = -\sqrt{x}$
$f(x) = 1-\sqrt{x}$

40. $f_0(x) = |x|$
$f(x) = |x+2|$

41. $f_0(x) = x$
$f(x) = 2x$

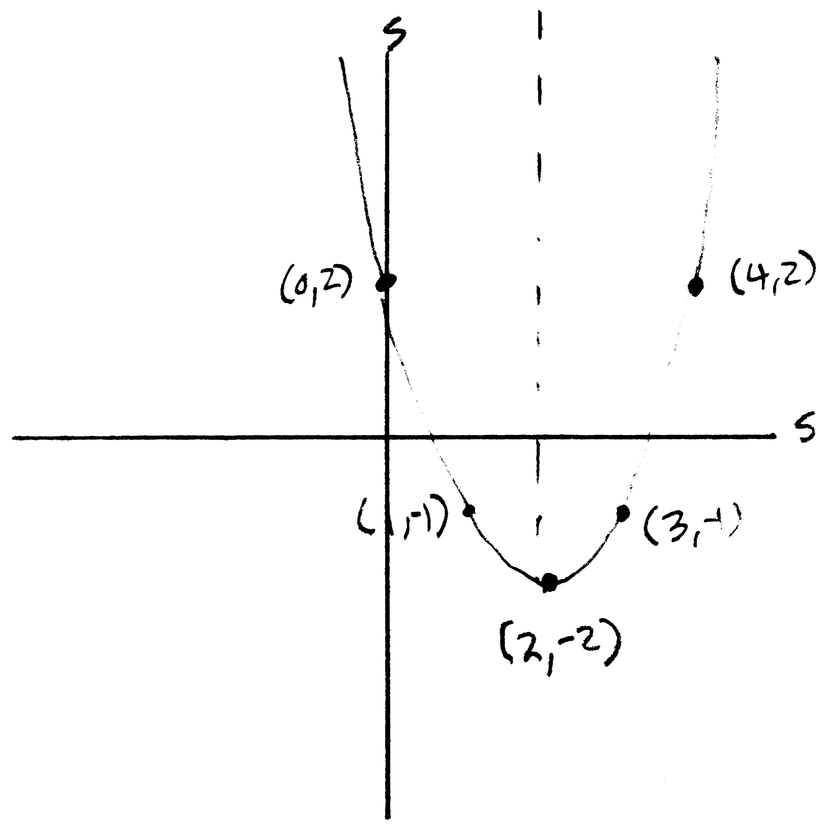
42. $f_0(x) = 0$
$f(x) = -3$

Section 3.1

20. $h(x) = x^2 - 4x + 2$

$= (x^2 - 4x + 4) + 2 - 4$

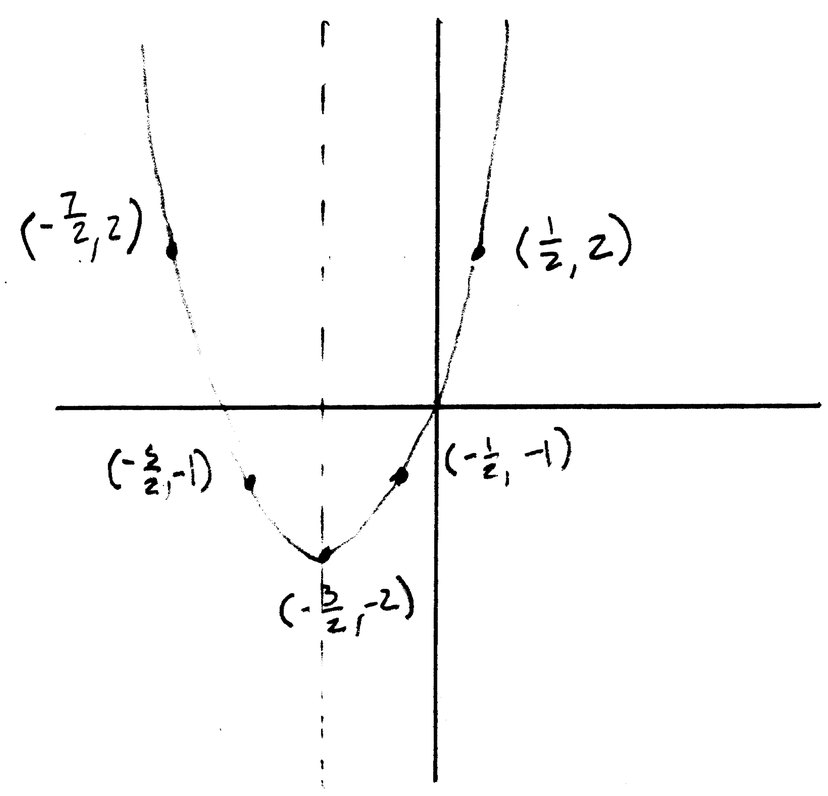
$h(x) = (x-2)^2 - 2$



24. $f(x) = x^2 + 3x + \frac{1}{4}$

$= (x^2 + 3x + \frac{9}{4}) + \frac{1}{4} - \frac{9}{4}$

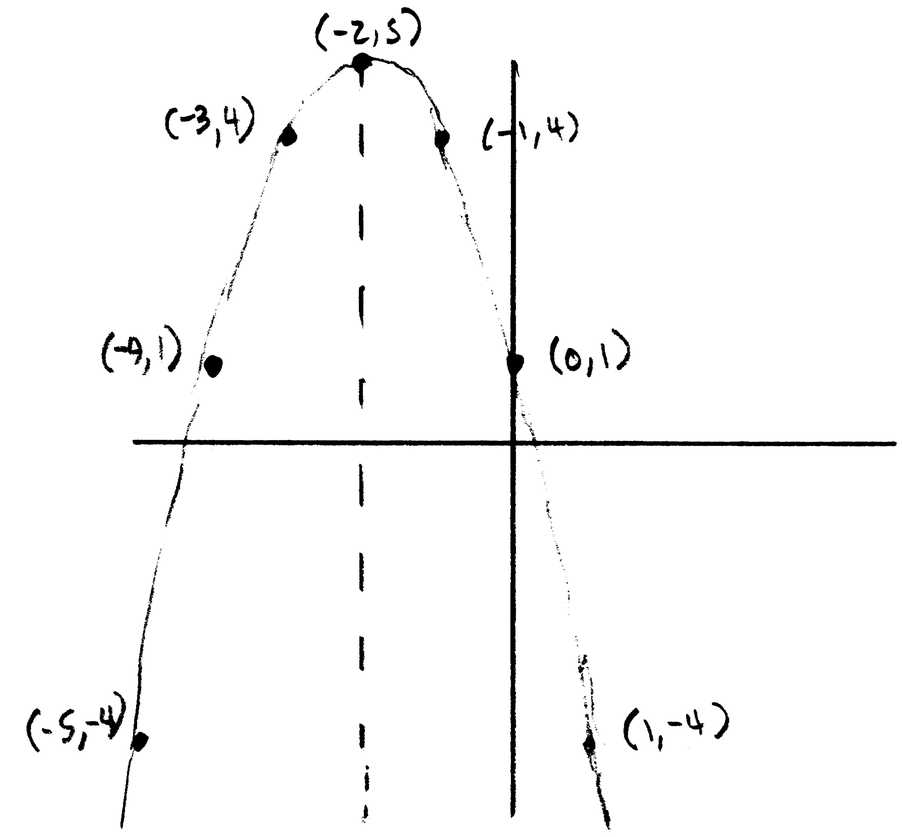
$f(x) = (x + \frac{3}{2})^2 - 2$



26. $f(x) = -x^2 - 4x + 1$

$= -(x^2 + 4x + 4) + 1 + 4$

$f(x) = -(x+2)^2 + 5$



32. $y = a(x-0)^2 - 1$

$y = ax^2 - 1$

$0 = a(1)^2 - 1$

$a = 1$

$y = x^2 - 1$

34. $y = a(x+2)^2 - 2$

$2 = a(0+2)^2 - 2$

$4a = 4$

$a = 1$

$y = (x+2)^2 - 2$

36. $y = -a(x-5)^2 + 0$

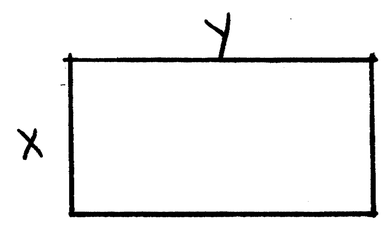
$-8 = -a(3-5)^2$

$-8 = -2a$

$a = 4$

$y = -4(x-5)^2$

48.

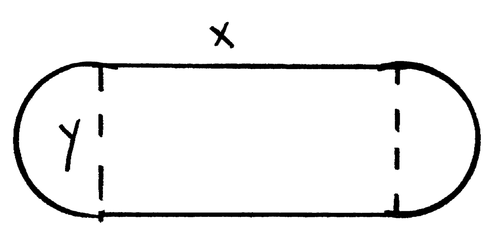


$2x+2y=540$
$x+y=270$
$y=270-x$

$a(x)=x(270-x)$
$=270x-x^2$
$=-(x^2-270x+18225)+18225$
$a(x)=-(x-135)^2+18225$

vertex $=(135, 18225)$
maximum area $=18225\ ft^2$ at width $135\ ft$.

50.



$2x+\pi y=200$
$\pi y=200-2x$
$y=\frac{1}{\pi}(200-2x)$
$y=\frac{2}{\pi}(100-x)$

$a(x)=\frac{2}{\pi}x(100-x)$
$=\frac{2}{\pi}(100x-x^2)$
$=-\frac{2}{\pi}(x^2-100x)$
$=-\frac{2}{\pi}(x^2-100x+2500)+\frac{5000}{\pi}$
$a(x)=-\frac{2}{\pi}(x-50)^2+\frac{5000}{\pi}$

vertex $=(50, \frac{5000}{\pi})$
maximum area $=\frac{5000}{\pi}\ m^2$ at width $=50m$.