7.6 Foundations of Math 11

p. 417 #1-5, 8

1. if $a > 0$, then parabola opens up; if $a < 0$ then parabola opens down

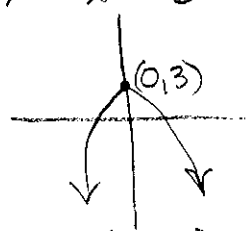
$y = a(x-h)^2 + k$

eq. of axis of symmetry $\Rightarrow x - p = 0$

vertex (h, k)

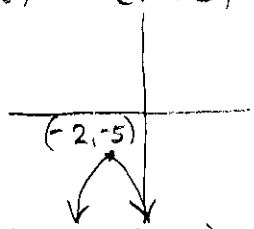
	dir. of opening	vertex	eq. of axis of sym
a) $f(x) = (x-3)^2 + 7$	up	(3, 7)	$x-3=0$, $x=3$
b) $m(x) = -2(x+7)^2 - 3$	down	(-7, -3)	$x+7=0$, $x=-7$
c) $g(x) = 7(x-2)^2 - 9$	up	(2, -9)	$x-2=0$, $x=2$
d) $n(x) = \frac{1}{2}(x+1)^2 + 10$	up	(-1, 10)	$x+1=0$, $x=-1$
e) $r(x) = -2x^2 + 5$	down	(0, 5)	$x=0$

2. a) $f(x) = -x^2 + 3$



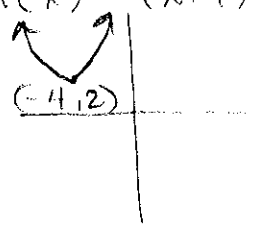
Opens down so it has a maximum, vertex (0, 3) is above x-axis so it has 2 x-intercepts.

b) $q(x) = -(x+2)^2 - 5$



opens down so it has a maximum, vertex (-2, -5) is below x-axis so it has no x-intercepts

c) $m(x) = (x+4)^2 + 2$



opens up so it has a minimum, vertex (-4, 2) is above the x-axis, so it has no x-intercepts.

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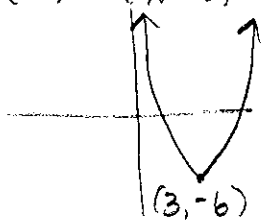
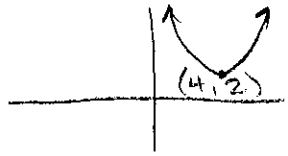
2. d) $n(x) = (x-3)^2 - 6$



opens up so it has a minimum
vertex (3, -6) is below x-axis
so it has 2 x-intercepts

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



opens up so it has a minimum
vertex (4, 2) is above x-axis
so it has no x-intercepts

3. $f(x) = a(x+2)^2 + 7$ point $(-1, 4)$

$y = a(x+2)^2 + 7$

$4 = a(-1+2)^2 + 7$

$4 = a(1)^2 + 7$

$4 = a + 7$

$-3 = a$

4. graph has vertex (3, 5)
opens down so a is negative (can't be D)
has point (0, -1)

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

$-1 = a(0-3)^2 + 5$

$-1 = 9a + 5$

$-6 = 9a$

$\frac{-6}{9} = a$

$\frac{-2}{3} = a$

$y = -\frac{2}{3}(x-3)^2 + 5$

equation C

P. 417 cont.

5. a) $y = (x-3)^2$ a is positive so parabola opens up vertex is (3,0) so it is graph iv

b) $y = -(x+4)^2 - 2$ a is negative so parabola opens down vertex is (-4,-2) so it is graph iii

c) $y = -x^2 - 3$ a is negative so parabola opens down vertex is (0,-3) so it is graph i

d) $y = (x-4)^2 + 2$ a is positive so parabola opens up vertex is (4,2) so it is graph ii

8. $h(x) = -0.03(x-9)^2 + 8$

a) axis of symmetry: $x - 9 = 0$
$x = 9$

b) vertex is (9,8) so highest point is 8 feet

c) $h(2) = -0.03(2-9)^2 + 8$
$= -0.03(-7)^2 + 8$
$= -0.03(49) + 8$
$= -1.47 + 8$
$= 6.53$ ft.

d) Candice touched the ball at 6.53 ft and Marleen touched it at 8 ft so the range is

$$\{h \mid 6.53 \leq h \leq 8, h \in R\}$$