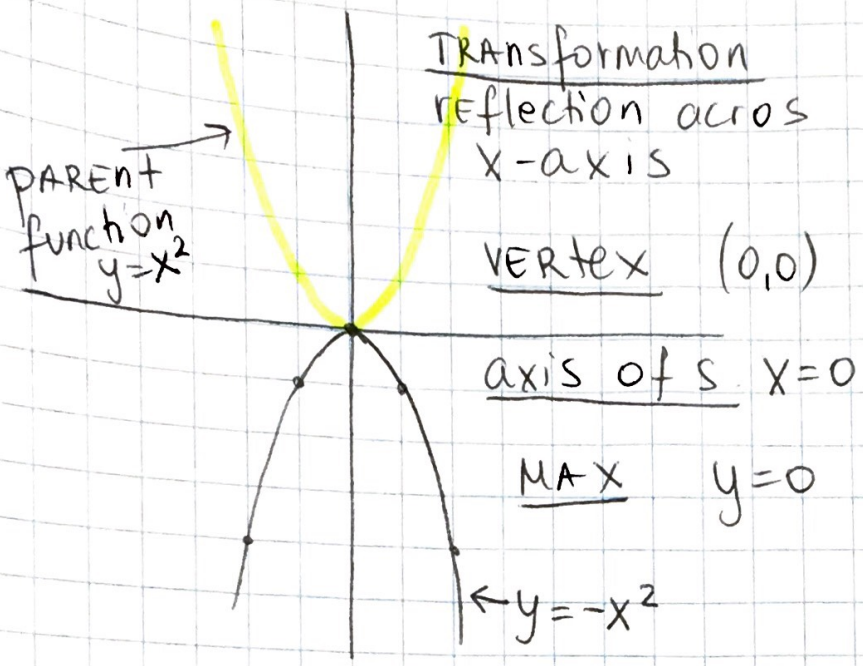
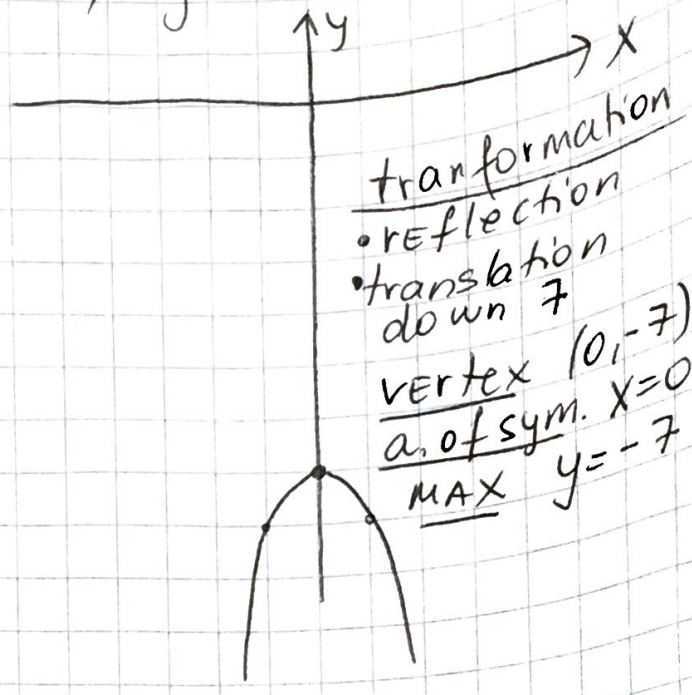
4-1 HOMEWORK solutions

1) a) $y = -x^2$

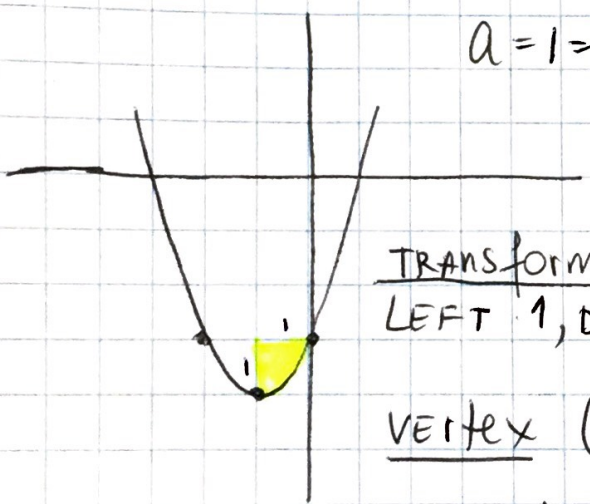


b) $y = -x^2 - 7$



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

$a = 1 = \frac{1}{1}$



TRANSformations
LEFT 1, DOWN 4

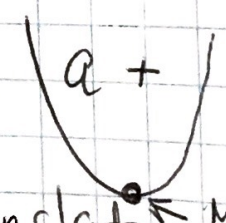
VERTEX (-1,-4)

axis of sym x=-1

MIN y=-4

2) A graph of a function has a minimum value when the LEADING coefficient (a) is positive

EX

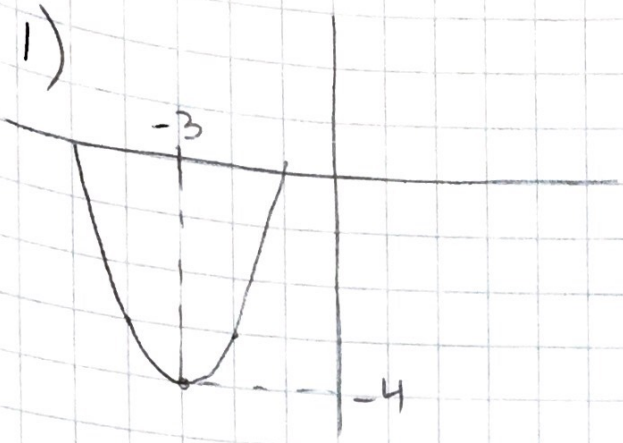


3) SIMILARITIES: both functions translate to the LEFT 4 units

differences: $y = -(x+6)^2 - 7$ also MOVES down 7 units, and it is reflected.

4-2 Homework solutions

1)



vertex
$(-3,-4)$

min
$y=-4$

axis of sym.
$x=-3$

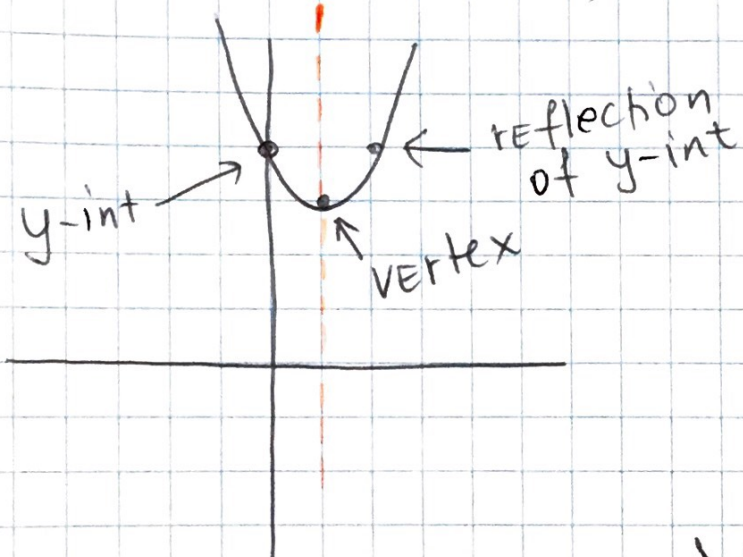
2) Graph $y=x^2-2x+4$ $a=1$ $b=-2$ $c=4$

vertex $x=\frac{-b}{2a}=\frac{2}{2\cdot 1}=\frac{2}{2}=\boxed{1}=h$

plug in 1 to find y $y=1^2-2\cdot 1+4=1-2+4=\boxed{3}=k$

$(\overset{h}{1},\overset{k}{3})$

y-int $(0,c)=(0,4)$



3) a) $y=x^2+2x+1$ $a=1$ $b=2$ $c=1$

vertex $x=\frac{-b}{2a}=\frac{-2}{2\cdot 1}=\frac{-2}{2}=\boxed{-1}$

$y=(-1)^2+2(-1)+1=1-2+1=\boxed{0}$

$(\overset{h}{-1},\overset{k}{0})$

axis of symmetry $x=-1$ min $y=0$

range $[0,\infty)$

3) b) $y = 3x^2 - 4x - 2$ ∪ $a = 3$ $b = -4$ $c = -2$

Vertex $x = \frac{-b}{2a} = \frac{4}{2 \cdot 3} = \frac{4}{6} = \boxed{\frac{2}{3}}$ (h, k) $\left(\frac{2}{3}, -\frac{10}{3}\right)$

On the test you may use the calculator to plug in and solve for y → $y = 3\left(\frac{2}{3}\right)^2 - 4\left(\frac{2}{3}\right) - 2$

$= 3 \cdot \frac{4}{9_3} - \frac{8}{3} - 2 = -\frac{4}{3} - \frac{6}{3} = \boxed{\frac{-10}{3}}$

axis of symmetry $x = \frac{2}{3}$

MIN $y = -\frac{10}{3}$

range $\left[-\frac{10}{3}, \infty\right)$

change the sign (typo)

4) $R = -2.5p^2 + 500p$ $a = -2.5$ $b = 500$ $c = 0$ ∩

a) What price MAXIMIZES revenue?

Find vertex $x = \frac{-b}{2a} = \frac{-500}{2(-2.5)} = \frac{-500}{-5}$

p

$= \boxed{100}$

price of $100 MAXIMIZES revenue

$R = y = -2.5(100)^2 + 500(100)$

$= \boxed{25\,000}$

b) MAXIMUM revenue is $25 000

HOMEWORK 4-3 solutions

1) MENU → 2 → enter x values in L1, y in L2

F2(CALC) → F3(REG) → F3(x^2)

$a = -4 \quad b = 24 \quad c = -37$

$$\boxed{y = -4x^2 + 24x - 37}$$

2) (see calculator steps shown in question 1)

time = x height = y

$a = -0.5 \quad b = 1 \quad c = 5.5$

a) $y = -0.5x^2 + x + 5.5$ (quadratic model)

b) at $x = 4$ sec $\quad y = -0.5(4)^2 + 4 + 5.5$

$-8 \quad +4 \quad +5.5$

the height of the ball is 1.5 ft $\quad = \boxed{1.5}$

c) THE ball's MAXIMUM height is the y value of vertex of this function

$$x = -\frac{b}{2a} = \frac{-1}{2(-0.5)} = \frac{-1}{-1} = \boxed{1}$$

plug in 1 for x $\quad y = -0.5(1)^2 + 1 + 5.5 = \boxed{6}$

the MAXIMUM height is 6 ft

4-4 part 1 solutions

1) Find GCF $15 = 5 \cdot 3$ $25 = 5 \cdot 5$

a) $15x^2 - 25x = 5x(3x - 5)$

b) $21h^3 + 35h^2 - 28h$ $21 = 7 \cdot 3$ $35 = 7 \cdot 5$ $28 = 7 \cdot 4$

$= 7h(3h^2 + 5h - 4)$

2) FACTOR $1 \cdot 2 = 2$ $1 + 2 = 3$

a) $x^2 + 3x + 2 = (x+1)(x+2)$

b) $x^2 + 15x + 36 = (x+3)(x+12)$ ($3+12$, $3 \cdot 12$)

c) $-r^2 + 11r - 10 = -(r^2 - 11r + 10)$ Typo add 0 ($-10+(-1)$, $-10 \cdot (-1)$)

$= -(-10)(-1)$

d) $a^2 - 5a - 14 = (a+2)(a-7)$ ($2+(-7)$, $2 \cdot (-7)$)

e) $a^2 + 10a - 75 = (a+15)(a-5)$ ($15+(-5)$, $15 \cdot (-5)$)

f) $27p^2 - 9p + 18 = 9(3p^2 - p + 2)$ $a \neq 1$ (a, c)

cannot be factored

$ac = 6$

$3 \cdot 2 = 6$

$3 + 2 = 5$

$1 \cdot 6 = 6$

$1 + 6 = 7$

3) FACTOR $a \neq 1$

a) $3a^2 + 31a + 36$

$ac = 3 \cdot 36 = 108$

$4 \cdot 27 = 108$

$4 + 27 = 31$

grouping method

$3a^2 + 27a + 4a + 36$

$3a(a+9) + 4(a+9) = \boxed{(3a+4)(a+9)}$

"slip and slide" method

$3a^2 + 31a + 36$

$* \; a^2 + 31a + 108$

$* \; (a+27)(a+4)$

$\div 3 \quad \div 3$

$\boxed{(a+9)(3a+4)}$

b) $7x^2 - 8x - 12$

$ac = 7(-12) = -84$

grouping $7x^2 - 14x + 6x - 12$

$-84 = -14 \cdot 6$ ✓

$7x(x-2) + 6(x-2)$

$-8 = -14 + 6$ ✓

$\boxed{(7x+6)(x-2)}$

slip and slide $7x^2 - 8x - 12$

$* \; x^2 - 8x - 84$

$(x-14)(x+6)$

$\div 7 \quad \div 7$

$\boxed{(x-2)(7x+6)}$

4-4 part 2 solutions
special cases

1)

a) $9x^2-1$ difference of squares $= (3x-1)(3x+1)$

b) $64x^2-16 = 16(4x^2-1) = 16(2x-1)(2x+1)$

c) $2h(h^2-4) = 2h(h-2)(h+2)$

d) $x^2-18x+81 = (x-9)^2$

$\sqrt{x^2}=x$ / $2\cdot x\cdot 9$ ✓ $\sqrt{81}=9$

e) $\sqrt{4x^2}=2x$ ✓ $\sqrt{9}=3$ ✓

$2\cdot 2x\cdot 3$ ✓

$12x^2+36x+27 = 3(4x^2+12x+9)$

$= 3(2x+3)^2$

f) $4x^2-22x+10 = 2(2x^2-11x+5)$

not a perfect square trinomial !!

means you must factor a "regular" way

$2\cdot 5 = 10$

$-1(-10) = 10$

$-1+(-10) = -11$

$2(2x^2-x-10x+5)$

$2(x(2x-1)-5(2x-1))$

$\boxed{2(x-5)(2x-1)}$