p392

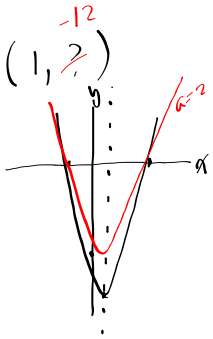
6. $y = 3(x-3)(x+1)$

$(y = a(x-r)(x-s))$ r and s are the roots or the x-intercepts.

x-intercepts: $(3,0)$ $(-1,0)$ (r, s)

y-intercept: $(0,-9)$ $c = a \cdot r \cdot s$

vertex: $x = \frac{3+(-1)}{2} = 1$ $(1, -12)$



$y = 3(x-3)(x+1)$
$y = 3(1-3)(1+1)$
$y = 3(-2)(2)$
$y = -12$

10. e) $f(x) = -\frac{1}{2}x^2 + 2x - 3$

2. $\frac{-2}{1}$ $f(x) = -\frac{1}{2}x(x-4) - 3$

Set equal to zero

$-\frac{1}{2}x(x-4) = 0$

$-\frac{1}{2}x = 0$ $x = 0$ point $(0,-3)$

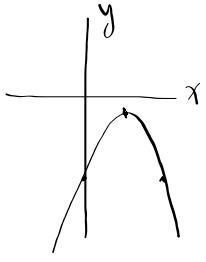
$x - 4 = 0$ $x = 4$ point $(4,-3)$

two points: $(0,-3)$ $(4,-3)$

vertex: $x = \frac{0+4}{2} = 2$ $(2, -1)$

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

y-intercept: $(0,-3)$



11. c) * x-intercepts: $(-6,0)$ $(2,0)$ (r, s)

y-intercept: $(0,3)$ } use either point.

* vertex: $(-2,4)$ (x, y)

$y = a(x-r)(x-s)$

$4 = a(-2-(-6))(-2-2)$

$4 = a(4)(-4)$

$4 = a(-16)$

$a = -\frac{4}{16}$

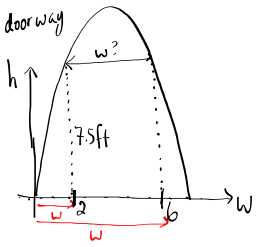
$a = -\frac{1}{4}$

(a, r, s)

$y = -\frac{1}{4}(x+6)(x-2)$

§7-5 Solving Quadratic Equations by Factoring

Example 1



height of the doorway:

$h(w) = -0.625w^2 + 5w$

$7.5 = -0.625w^2 + 5w$

$\frac{0}{-0.625} = \frac{-0.625w^2 + 5w - 7.5}{-0.625}$

$0 = w^2 - 8w + 12$

$0 = (w-6)(w-2)$

$w - 6 = 0$ $\quad$ $w - 2 = 0$

$w = 6$ $\quad$ $w = 2$

Since the crate has to fit between $w=2$ and $w=6$, the crate can be no wider than 4ft. (6-2)

Example 2

Determine the roots of the following equation + verify the solution.

$75p^2 - 192 = 0$

$3(25p^2 - 64) = 0$

difference of squares.

$3(5p+8)(5p-8) = 0$

$5p + 8 = 0$ $\quad$ $5p - 8 = 0$

$5p = -8$ $\quad$ $5p = 8$

$p = -\frac{8}{5}$ $\quad$ $p = \frac{8}{5}$

verify: $75\left(-\frac{8}{5}\right)^2 - 192 = 0$

$\frac{75^{3}(64)}{25} - 192 = 0$

$192 - 192 = 0$

$0 = 0$ ✓

Another way:

$75p^2 - 192 = 0$

$75p^2 = 192$

$p^2 = \frac{192}{75}$

$p = \pm\sqrt{\frac{192}{75}}$ (÷3, ÷3)

$p = \pm\sqrt{\frac{64}{25}}$

$p = \pm\frac{8}{5}$

Example 3 (p403)

Solve and verify: $4x^2 + 28x + 49 = 0$

perfect square trinomial

$4x^2$: perfect square $(2x)^2$; 49: perfect square $(7)^2$; $28x$: double $(2x)(7)$

$$(2x + 7)(2x + 7) = 0$$

$$2x + 7 = 0$$

$$2x = -7$$

$$x = -\frac{7}{2}$$

← only 1 solution (two identical factors)

graph → vertex is on the x-axis.

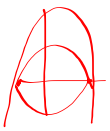
Example 4.

Two roots -5 and 7. What might be the equation?

$x = -5$ $\quad$ $x = 7$

$x + 5 = 0$ $\quad$ $x - 7 = 0$

one factor $\quad$ other factor.



equation: $0 = (x + 5)(x - 7)$

$f(x) = a(x - r)(x - s)$

other possibilities: $0 = \frac{1}{2}(x + 5)(x - 7)$

$0 = -5(x + 5)(x - 7)$

Example 5

$4x^2 = 9x$

$\frac{4x^2}{x} = \frac{9x}{x}$ ← do not divide by x ← x could be zero

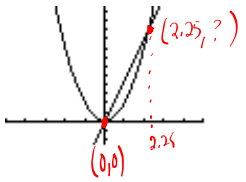
$4x = 9$

$x = \frac{9}{4}$

$x = 2.25$

WRONG

There are two solutions not just one!



$4x^2 = 9x$

$4x^2 - 9x = 0$

$x(4x - 9) = 0$

$x = 0$ $\quad$ $4x - 9 = 0$

$4x = 9$

$x = \frac{9}{4}$

TO DO

① c4u (p405)