

Unit 3 – REVIEW 1

Date: Mar. 25/11

Recall: Form

Advantage

Standard form: $f(x) = ax^2 + bx + c$ y-intercept is "c"Vertex form: $f(x) = a(x-h)^2 + k$ vertex (h, k)Factored form: $f(x) = a(x-r)(x-s)$ x-intercepts (zeros): r, s1a) Write $f(x) = (3x-4)(2x-1)$ in standard form. b) Write $f(x) = 8x^2 - 2x - 21$ in factored form.

$$= 6x^2 - 3x - 8x + 4$$

$$= 6x^2 - 11x + 4$$

$$= (4x-7)(2x+3)$$

2. Determine the zeros, the axis of symmetry, and the maximum or minimum value for

 $f(x) = x^2 + 6x - 40$. Show your work.

$$0 = (x+10)(x-4)$$

$$\therefore x = -10 \text{ or } x = 4$$

$$\text{A of S: } x = \frac{-10+4}{2}$$

$$= -\frac{6}{2}$$

$$x = -3$$

$$f(-3) = (-3+10)(-3-4)$$

$$= (7)(-7)$$

$$= -49$$

Zeros:	-10, 4
Axis of Symmetry:	$x = -3$
Max(Min)value:	-49

3. Solve

a) $2x^2 - 3x = 9$

$$2x^2 - 3x - 9 = 0$$

$$(2x+3)(x-3) = 0$$

$$\therefore 2x+3=0 \text{ or } x-3=0$$

$$2x = -3 \quad x = 3$$

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

b) $x^2 = 13x - 30$

$$x^2 - 13x + 30 = 0$$

$$(x-10)(x-3) = 0$$

$$\therefore x-10=0 \text{ or } x-3=0$$

$$x = 10 \quad x = 3$$

4. Can all quadratic equations be solved by factoring?

No. If the roots are not rational; i.e. perfect fractions, then we can not solve by factoring.

[We can, however, solve using the Quadratic Formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

5. A ball is thrown from a cliff.

The height of the ball above the ground after it is thrown is modelled by the function $h(t) = -4t^2 + 8t + 192$, where $h(t)$ is the height in metres, and t is the time in seconds.

- a) How high is the cliff?
 b) When will the ball be 27 m above the ground?
 c) What is the maximum height that the ball reaches?

a) find the height of the ball when $t=0$
 (before it is thrown)

$$h(t) = -4(0)^2 + 8(0) + 192 = 192$$

\therefore the cliff's height is 192m

c) Axis of Symmetry

$$x = \frac{-5.5 + 7.5}{2} = \frac{2}{2} = 1$$

$$h(1) = -4(1)^2 + 8(1) + 192 = -4 + 8 + 192 = 196$$

\therefore the max. height the ball reaches is 196m above the ground

b) find t when $h(t) = 27$

$$27 = -4t^2 + 8t + 192$$

$$0 = -4t^2 + 8t + 165$$

$$0 = -(4t^2 - 8t - 165)$$

$$0 = -(2t - 15)(2t + 11)$$

$$\therefore 2t - 15 = 0 \text{ or } 2t + 11 = 0$$

$$2t = 15$$

$$t = \frac{15}{2}$$

$$= 7.5$$

$$2t = -11$$

$$t = -\frac{11}{2}$$

$$t = -5.5$$

inadmissible

\therefore the ball is 27m above the ground when $t = 7.5$ seconds

6. The population of a town $P(t)$ is modelled by the function $P(t) = 6t^2 - 75t + 2100$, where t is time in years. NOTE: $t = 0$ represents the year 2000. According to the model,

a) When will the population reach 3000?

find t when $P(t) = 3000$

$$3000 = 6t^2 - 75t + 2100$$

$$0 = 6t^2 - 75t - 900$$

$$0 = 3(2t^2 - 25t - 300)$$

$$0 = 3(2t + 15)(t - 20)$$

$$\therefore 2t + 15 = 0 \text{ or } t - 20 = 0$$

$$t = -\frac{15}{2}$$

$$t = 20$$

$$= -7.5 \text{ years}$$

inadmissible

\therefore the population will reach 3000 in the year 2020.

b) What will the population be in 2035?

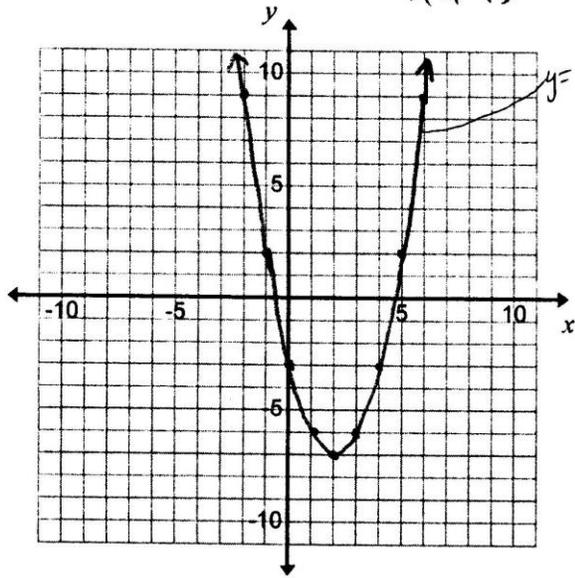
find $P(t)$ when $t = 35$

$$P(35) = 6(35)^2 - 75(35) + 2100$$

$$= 6825$$

\therefore in 2035, the population will be 6825

7a) Sketch $f(x) = (x-2)^2 - 7$ $v(2, -7)$



b) Write $f(x) = (x-2)^2 - 7$ in standard form.

$$= x^2 - 4x + 4 - 7$$

$$= x^2 - 4x - 3$$

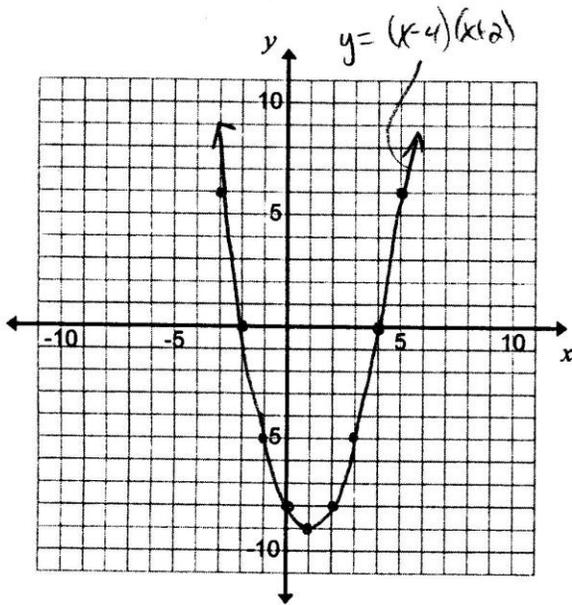
c) Can $f(x) = x^2 - 4x - 3$ be written in factored form?

No. This trinomial does not factor.

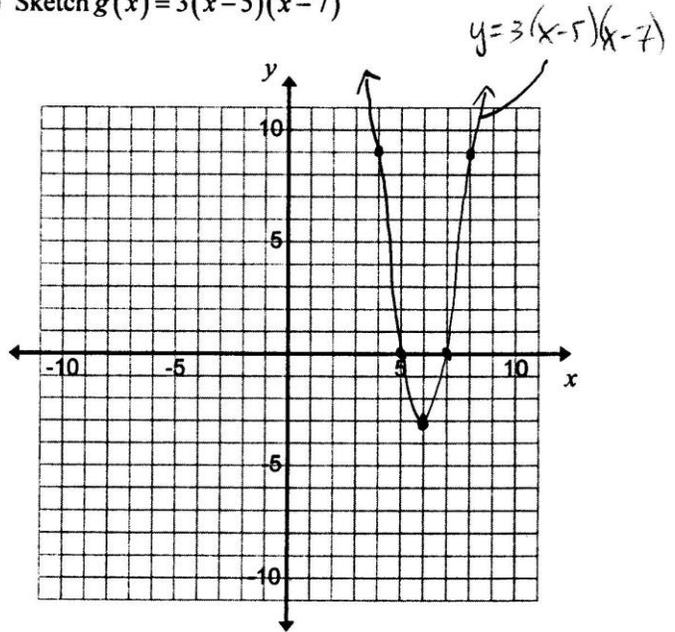
(The x-intercepts are irrational)



8a) Sketch $f(x) = (x-4)(x+2)$



b) Sketch $g(x) = 3(x-5)(x-7)$



$$0 = (x-4)(x+2)$$

$$\therefore x = 4 \text{ or } x = -2$$

At $x = 1$

$$f(1) = (1-4)(1+2)$$

$$= (-3)(3)$$

$$= -9$$

$$0 = 3(x-5)(x-7)$$

$$\therefore x = 5 \text{ or } x = 7$$

At $x = 6$

$$g(6) = 3(6-5)(6-7)$$

$$= 3(1)(-1)$$

$$= -3$$