NOTES: SECONDARY 2 HONORS

UNIT 6 – WRITING QUADRATIC EQUATIONS

STARTER

1. Solve.

$3x^2 - 7x + 2 \geq 0$

$(3x-1)(x-2)=0$

$x=\frac{1}{3}$ $x=2$

$(-\infty, \frac{1}{3}] \cup [2, \infty)$

2. When is the function undefined?

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

$x \neq 4$

$x-4 \neq 0$

3. When is the function zero?

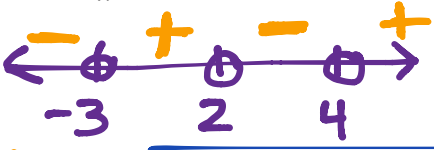
$f(x) = \frac{(x+3)(x-2)}{x-4}$

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

$x=-3$ $x=2$

3. Solve.

$0 > \frac{(x+3)(x-2)}{x-4}$



$\frac{(-)(-)}{+}$

$(-\infty, -3) \cup (2, 4)$

RECALL:

Standard Form: $y = ax^2 + bx + c$

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

Intercept/Factored Form: $y = a(x-p)(x-q)$

- Use vertex form when given the vertex and a point.
- Use intercept/factored form when given x-intercepts or zeros.

Example:

1. Write an equation of the quadratic with vertex $(-3,-1)$ and goes through the point $(-5,-5)$.

(h,k) (x,y)

- Which form do you want to use? vertex form

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

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

$+1 \quad +1$

$-4 = a(-5+3)^2$

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

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

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

(x,y) $(p,0)$ $(q,0)$

2. Write an equation of the quadratic that passes through the point $(3,-3)$ with x-intercepts $(-3,0)$ and $(5,0)$.

- Which form do you want to use? intercept form

$y = a(x-p)(x-q)$

$-3 = a(3+3)(3-5)$

$-3 = a(6)(-2)$

$\frac{-3}{-12} = \frac{-12a}{-12}$ $a = \frac{1}{4}$

$y = \frac{1}{4}(x+3)(x-5)$

3. Write a quadratic in **standard form** with zeros -2 and 4.

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

$y=x^2-2x-8$

4. Write an equation of the quadratic with vertex $(-3,3)$ and goes through the point $(3,7)$.

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

$7=a(3+3)^2+3$

$-3 \quad -3$

$4=a(3+3)^2$

$4=a(6)^2$

$4=36a$

$\frac{4}{36}=\frac{36a}{36}$

$a=\frac{1}{9}$

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

5. Write an equation of the quadratic that has x-intercepts $(-3,0)$ and $(6,0)$ and passes through the point $(3,8)$.

$y=a(x-p)(x-q)$

$8=a(3+3)(3-6)$

$8=a(6)(-3)$

$8=-18a$

$\frac{8}{-18}=\frac{-18a}{-18}$

$a=\frac{-4}{9}$

$y=\frac{-4}{9}(x+3)(x-6)$

6. If a gym charges its members \$300 per year to join, they get 1000 members. For each \$2 increase in price they can expect to lose 5 members. How much should the gym charge to maximize its revenue? What is the gym's maximum revenue?

revenue = # members × price

$R=(1000-5x)(300+2x)$

$R=300000+2000x-1500x-10x^2$

$R=-10x^2+500x+300000$

$R=-10(x^2-50x+625)+300000-(-10)625$

$R=-10(x-25)^2+306250$

$x=25$

The gym should charge \$50 to maximize the revenue of \$306250

$V:(25,306250)$