$$\frac{f(x+h)-f(x)}{h}$$

$f(x) = -2x^2-3x-5$

$-2\underbrace{(x+h)^2}_{x^2+2hx+h^2}-3(x+h)-5$

$-\cancel{2x^2}-4hx-2h^2-\cancel{3x}-3h-\cancel{5}+\cancel{2x^2}+\cancel{3x}+\cancel{5}$

$-4hx-2h^2-3h$

---

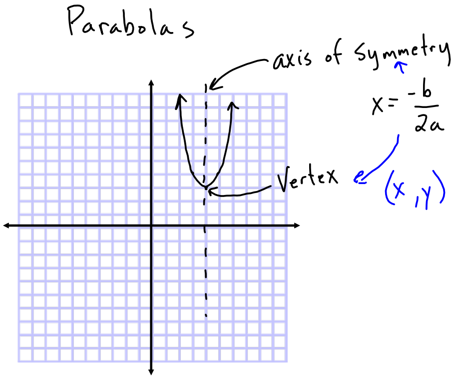
x^3-9x

$x(x^2-9)$

$x(x-3)(x+3)$

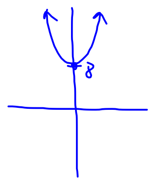
$\{x \mid x \neq 0, 3, -3\}$

4.3 Parabolas



Pick the Graph

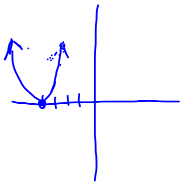
$f(x) = x^2+8$



$f(x) = x^2+8x+16$

$x = -\frac{b}{2a} = \frac{-8}{2} = -4$

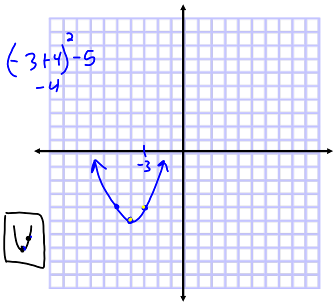
$y = (-4)^2+8(-4)+16 = 0$



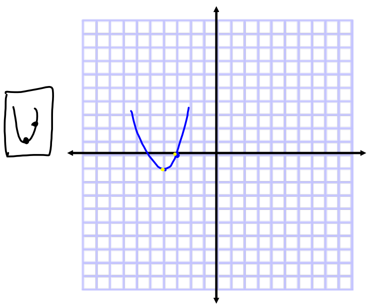
$f(x) = (x+4)^2 - 5$ Graph it

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

-4



$f(x) = x^2+8x+15$



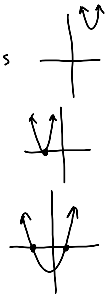
$x = -\frac{b}{2a}$

Discriminant:

$b^2-4ac<0$ No Real Zeros

$b^2-4ac=0$ One Real Zero

$b^2-4ac>0$ Two Real Zeros

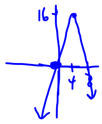


For $f(x)=-x^2+8x$

Open up or Down

Vertex? $-(4)^2+8(4)$

$(4,16)$



Domain: $(-\infty,\infty)$

Range: $(-\infty,16)$

Axis of Symmetry?

$x=-\frac{b}{2a}=\frac{-8}{2(-1)}=4$ $x=4$

x-intercepts? $-x(x-8)$ $x=0,8$

b^2-4ac $64-4(-1)(0)$ 64 Two Real

y-intercepts? 0

Increasing: $(-\infty,4)$

Decreasing: $(4,\infty)$

$f(x)=5x^2+10x$

This Quadratic function has a ____ value at $(-1,-5)$.

Maximum or Minimum

$x=\frac{-b}{2a}=\frac{-10}{2(5)}=-1$

$y=5(-1)^2+10(-1)=-5$

4.4

price - p x-sold demand $p=-\frac{1}{9}x+100$

Revenue Model (R=xp): $R=x\left(-\frac{1}{9}x+100\right)=100x-\frac{1}{9}x^2$

Domain: $[0,\infty)$

Revenue? $x=200$

$100(200)-\frac{1}{9}(200)^2=\$15555.60$

#Sold - Maximizes the Revenue

$x=\frac{-b}{2a}=\frac{-100}{2\left(-\frac{1}{9}\right)}=450$

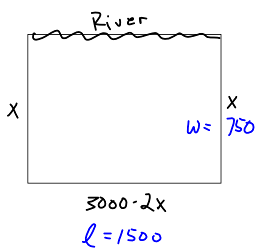
Max Revenue

$100(450)-\frac{1}{9}(450)^2=\$22500$

What price to get max Rev.?

$\frac{22500}{450}=50$

3000 ft. of fencing



Max Area:

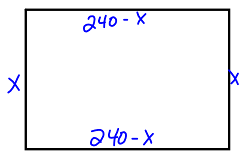
$A=(3000-2x)x$

$3000x-2x^2$

$-\frac{b}{2a}=\frac{-3000}{2(-2)}=750$

Max Area = 1,125,000 square yards

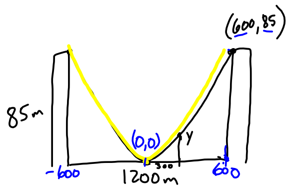
David wishes to enclose a rectangular area with 480 yards of fencing.



$\frac{480-2x}{2}$

Find the function for the Area:

$A(x)=240x-x^2$



$(h,k) = (0,0)$

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

$y = ax^2$

$85 = a(600)^2$

$a = .000236$

$\boxed{y = .000236x^2}$

$y = .000236(300)^2$

$y = 21.24$ meters