Graphing $f(x)=ax^2+bx+c$

3.3 2 days

Graphing $f(x)=ax^2+bx+c$ - the x-coord. of the vertex is at $-b/2a$ (and axis of symmetry) the y-coord. is what you get when you plug back into the eqn.

Maximum/Minimum Values - the graph has a max value if it points ↓ & a min value if it points ↑ (this value is the y-coord. of the vertex)

Ex 1. Find the axis of symmetry & the vertex of the function, does the graph have a max or a min?

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

axis of sym $=\frac{-b}{2a}=\frac{-(-2)}{2(3)}=\frac{2}{6}=\boxed{\frac{1}{3}}$

Vertex: $y=3(\frac{1}{3})^2-2(\frac{1}{3})$

$=3(\frac{1}{9})-\frac{2}{3}$

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

Graph pts ↑ so MIN of $-\frac{1}{3}$

b) $g(x)=x^2+6x+5$

$=\frac{-6}{2(1)}=\boxed{-3}$

$y=(-3)^2+6(-3)+5$

$9-18+5=-4$

V: $(-3,-4)$

Graph pts ↑ so min of -4

c) $h(x)=-\frac{1}{2}x^2+7x-4$

$=\frac{-7}{2(-\frac{1}{2})}=\frac{-7}{-1}=\boxed{7}$

$y=-\frac{1}{2}(7)^2+7(7)-4$

$=-\frac{1}{2}(49)+49-4=20\frac{1}{2}$

V: $(7,20\frac{1}{2})$

Graph pts ↓ so Max of $20\frac{1}{2}$

Ex 2. Graph the function. Describe the domain & range

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

1st find the vertex, then plot a pt to either side of vertex.

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

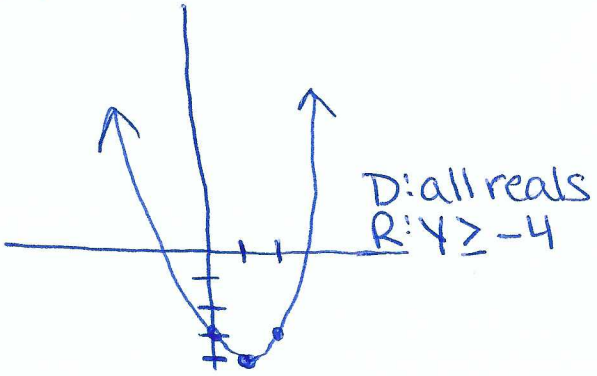
$y=1^2-2(1)-3=-4$

V: $(1,-4)$

plug in a pt to the left & right of the x-coordinate

$y=(0)^2-2(0)-3=-3$; $(0,-3)$

$y=(2)^2-2(2)-3$ $(2,-3)$



D: all reals

R: $y\geq -4$

b) $h(x)=-5x^2-10x-2$

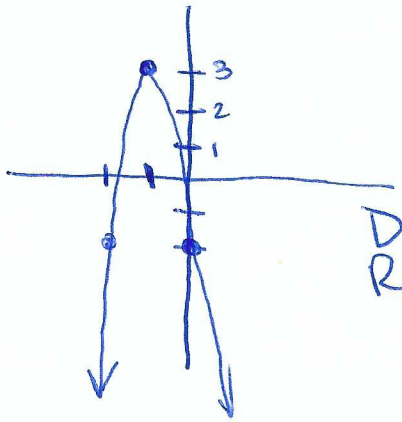
$x=\frac{-b}{2a}=\frac{-(-10)}{2(-5)}=\frac{10}{-10}=-1$

$y=-5(-1)^2-10(-1)-2=3$

V: $(-1,3)$

$y=-5(-2)^2-10(-2)-2=-2$ $(-2,-2)$

$y=-5(0)^2-10(0)-2=-2$ $(0,-2)$



D: all reals

R: $y\leq 3$

3.3A HW p. 140 1, 3-7, 9, 10, 13-16

3.3B HW p. 140 21-23 + Wkst