Turn in HW#2:

Assigned Friday 3/1:
1.5 #51-73odd

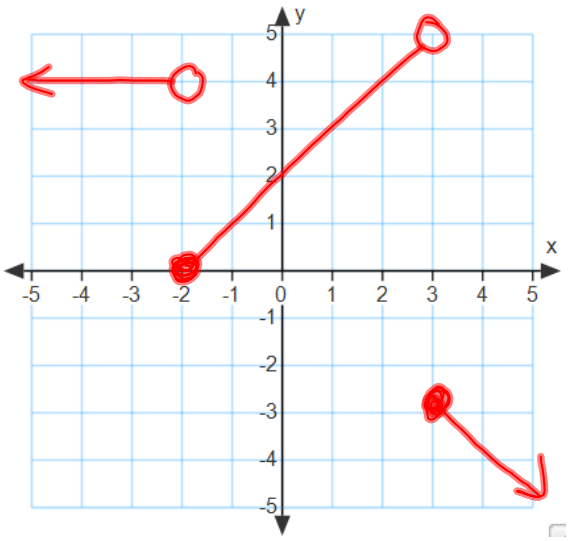
Assigned Monday 3/4:
1.6 #23,29,31,71,75,811.7 #9,11,39-47odd

Assigned Wednesday 3/6:1.7 #59-69odd, 77-83odd, 93-101odd, 115-121odd

Assigned Thursday 3/7:2.1#33,47,77-81odd, 91-99odd

Review: Graph the piecewise function.

$$f(x)=\begin{cases}4, & x<-2\\ x+2, & -2\le x<3\\ -x, & x\ge 3\end{cases}$$



33. $I = Prt$

$r = 0.05$

$t = 1$

$\$1365 = P + I$

$P = ?$

$1365 - P = P(0.05)$

$1365 = 0.05P + P$

$1365 = 1.05P$

$$\frac{1365}{1.05} = P$$

47.

	distance = rate x time		
Amtrak	400	$r+14$	$\frac{400}{r+14}$
Central Railway	330	r	$\frac{330}{r}$

$$\frac{400}{r+14} = \frac{330}{r}$$

$$400r = 330(r+14)$$
$$400r = 330r + 330(14)$$
$$70r = 330(14)$$
$$r = \frac{330(14)}{70}$$
$$r = 66$$

2.3 Quadratic Equations, Functions, and Models

A **quadratic equation** is an equation of the form:

$$ax^2 + bx + c = 0$$

A **quadratic function** is a function of the form:

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

$a \neq 0$

a, b, c are real #'s

Equation-solving Principles

Zero Product Property:

If $AB=0$, then $A=0$ or $B=0$.

$(x+3)(x-5)=0 \Rightarrow x+3=0$ or $x-5=0$

$x=-3$ or $x=5$

Square Root Theorem:

If $[f(x)]^2=c$, then $f(x)=\pm\sqrt{c}$

$x^2=4$

$x=\pm 2$

Completing the Square Goal: $(x+d)^2=k$

$ax^2+bx+c=0$

$ax^2+bx=-c$

$a\left(x^2+\frac{b}{a}x\right)=-c$

$x^2+\frac{b}{a}x=\frac{-c}{a}$

$x^2+\frac{b}{a}x+\left(\frac{b}{2a}\right)^2=\frac{-c}{a}+\left(\frac{b}{2a}\right)^2$

$\left(x+\frac{b}{2a}\right)^2=\frac{-c}{a}\cdot\frac{4a}{4a}+\frac{b^2}{4a^2}$

$(a+b)^2=a^2+2ab+b^2$

$\left(x+\frac{b}{2a}\right)^2=\frac{b^2-4ac}{4a^2}$

$x+\frac{b}{2a}=\pm\sqrt{\frac{b^2-4ac}{4a^2}}$

$x=\frac{-b}{2a}\pm\frac{\sqrt{b^2-4ac}}{2a}$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

1. move constant term to right
2. factor out x^2-coeff.
3. divide both sides by that coeff.
4. complete the square: take half x-coeff, square it, add to both sides
5. rewrite LHS as a perfect square & simplify RHS
6. apply the Square root Thm.
7. rearrange to solve for x and simplify

Solve. $-2x^2+x+3=0$

$-2x^2+x=-3$

$-2\left(x^2-\frac{1}{2}x\right)=-3$

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

$x^2-\frac{1}{2}x+\left(-\frac{1}{4}\right)^2=\frac{3}{2}+\frac{1}{16}$

$\frac{1}{2}\left(-\frac{1}{2}\right)=-\frac{1}{4}$

$\left(-\frac{1}{4}\right)^2=\frac{1}{16}$

$\left(x-\frac{1}{4}\right)^2=\frac{25}{16}$

$x-\frac{1}{4}=\pm\sqrt{\frac{25}{16}}$

$x=\frac{1}{4}\pm\frac{5}{4}$

$\pm\frac{5}{4}+\frac{1}{4}$

$\frac{1}{4}+\frac{5}{4}=\frac{6}{4}=\boxed{\frac{3}{2}}$

$\frac{1}{4}-\frac{5}{4}=\frac{-4}{4}=\boxed{-1}$

The Quadratic Formula

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

The Discriminant

The discriminant is the $b^2 - 4ac$ part of the quadratic formula.
If $b^2 - 4ac > 0$, the quadratic equation will have two distinct real roots (solutions).
If $b^2 - 4ac = 0$, the quadratic equation will have one real "double" root.
If $b^2 - 4ac < 0$, the quadratic equation will have two complex conjugate roots.

Equations Reducible to Quadratic

HW

23# 27-35odd, 53-59odd