Turn in HW#2:

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

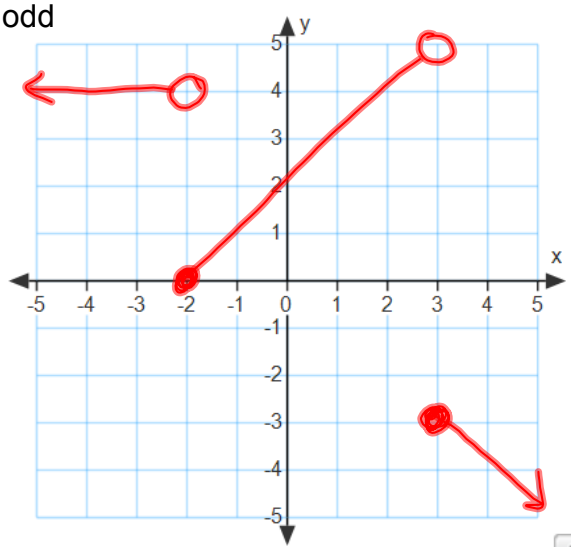
Assigned Monday 3/4:
1.6 #23,29,31,71,75,81
1.7 #9,11,39-47odd

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.

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



47.

	rate	time	distance
Amtrak	$r+14$	$\frac{400}{r+14}$	400 mi
Central	r	$\frac{330}{r}$	330 mi

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

$$400r=330(r+14)$$

99. $a = b + bcd \; ; \; b$

$a = b(1 + cd)$

$\frac{a}{1+cd} = b$

33. $r = 0.05$

$t = 1$

$P + I = 1365$

$P = ?$

$I = Prt$

$1365 - P = P(0.05)$

2.3 Quadratic Equations, Functions, and Models

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

$$Ax^2+Bx+C=0$$

$A \neq 0$

A, B, C - real #'s

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

$$f(x)=Ax^2+Bx+C$$

Equation-solving Principles

Zero Product Property:

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

$(x+2)(x-1)=0 \Rightarrow x+2=0$ or $x-1=0$

$x=-2$ or $x=1$

Square Root Theorem:

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

$x^2=4$

$x=\pm 2$

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

$ax^2+bx+c=0$

$ax^2+bx=-c$

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

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

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

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

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

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

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

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

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

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

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

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

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

$x^2-\frac{1}{2}x+\left(\frac{-1}{4}\right)^2=\frac{3}{2}\cdot\frac{8}{8}+\frac{1}{16}$

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

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

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

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

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

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 # 27-35 odd, 53-59 odd