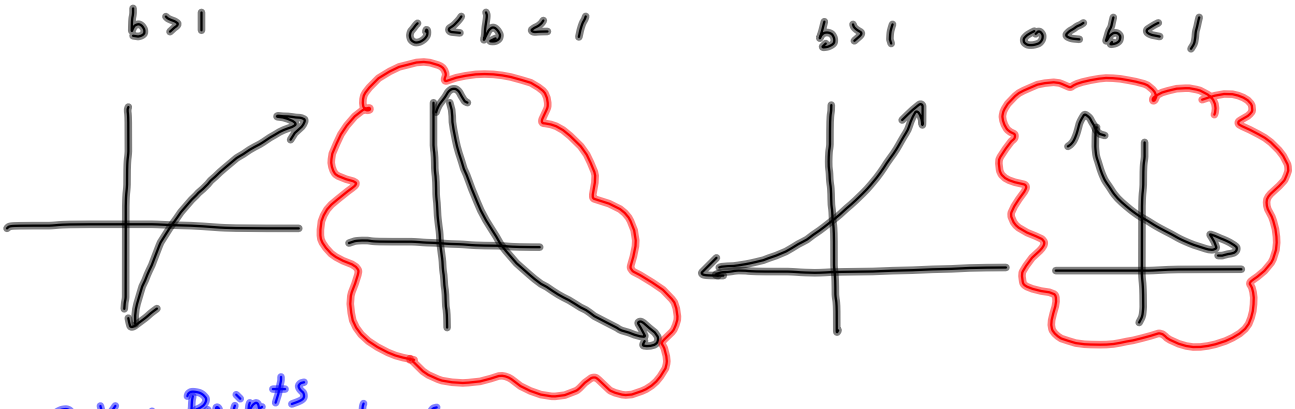
C4 Nothing new on graphing, except the Basic Function graphs.

$\log_b x$ b^x



3 Key Points See Solutions

http://www.harryzaims.com/121-all/121-fall-13/homework/solutions/

S 4.1-4.4 posted.

Summarize to this Point

CP S P.1 Interval Notation

S P.2 Exponents I

$a^b a^c = a^{b+c}$, $(a^b)^c = a^{bc}$

$3^{5x+2} = 3^{5x} \cdot 3^2 = 3^2 \cdot 3^{5x} = 3^2 \cdot (3^5)^x$

$a \cdot b^x$

$(ab)^c = a^c b^c$

$(a+b)^c = a^c + b^c$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

S P.3 Exponents II

$a^{\frac{1}{m}} = \sqrt[m]{a}$ $a^{\frac{b}{c}} = \sqrt[c]{a^b} = \left(\sqrt[c]{a}\right)^b$

$16^{\frac{3}{4}} = (16^{\frac{1}{4}})^3 = 2^3 = 8$

S P.7 Complex #s

Conjugate Pairs $z, \bar{z}$

$z = a+bi$, $\bar{z} = a-bi$

$z + \bar{z} = 2a$

$z\bar{z} = (a+bi)(a-bi) = a^2 - (bi)^2 =$

$(\square + \Delta)(\square - \Delta) = \square^2 - \Delta^2$

$\sqrt{a^2+b^2} = a+b$

$\sqrt{3^2+4^2} = 3+4 = 7$

$\sqrt{25} = 5 = 7$

Nooooooo!

Nov 8-7:51 AM

C1 S1.4

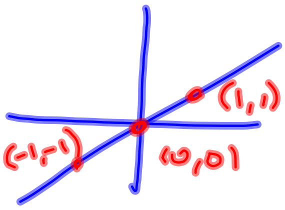
(x, y)

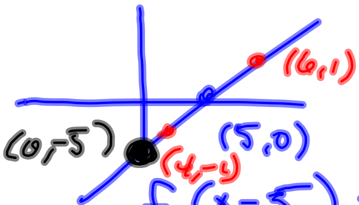
$m = \frac{y_2 - y_1}{x_2 - x_1}$

$$y = m(x - x_1) + y_1$$

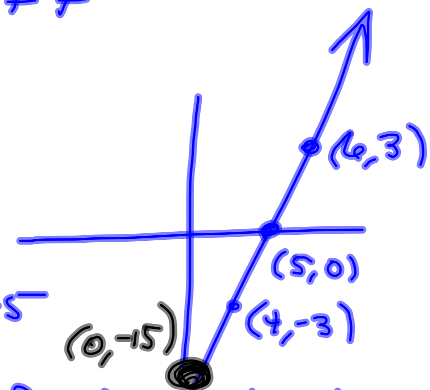
Basic function

$y = x = f(x)$ $y = 3(x-5)+7$



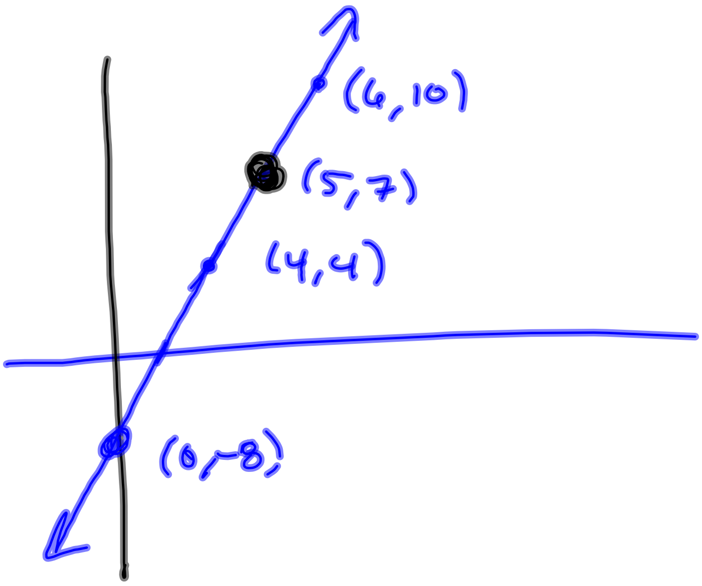


$f(x-5) = x-5$



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

$3f(x-5)+7 = g(x) = 3(x-5)+7$



§1.4 $ax^2+bx+c=0$

Discriminant $= b^2-4ac$

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

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

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

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

$k=f\left(-\frac{b}{2a}\right)$

$a(x-h)^2+k=0$

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

$(x-h)^2=-\frac{k}{a}$

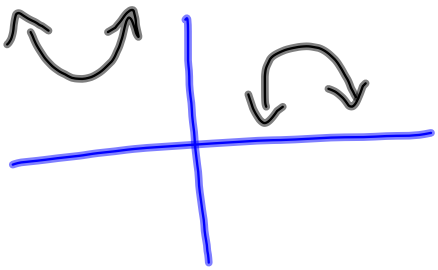
$x-h=\pm\sqrt{-\frac{k}{a}}$

$x=h\pm\sqrt{-\frac{k}{a}}$

$=-\frac{b}{2a}\pm\sqrt{-\frac{k}{a}}$

See §3.1 for followups of Quadratic Inequalities

$ax^2+bx+c>0$ $(\geq,\leq,<)$



S1.7 $|2x+6| \geq C$ $<, \leq, >$

$2x+6 \geq C$

C2

S2.3 Basic functions

$x, \frac{1}{x}, x^2, x^3, \frac{1}{x^2}, \sqrt{x}, \sqrt[3]{x}$

$b^x, \log_b x$

Transforming them for graphs.

See steps (ORDER)

S2.4 $(f \circ g)(x) = f(g(x))$

$\mathcal{D} = \{x \mid x \in \mathcal{D}(g) \text{ and } g(x) \in \mathcal{D}(f)\}$

$f(x) = \sqrt{x-7}$ $g(x) = \frac{1}{(x+2)(x-11)}$

$f(g(x)) = \sqrt{\frac{1}{(x+2)(x-11)} - 7}$

$\mathcal{D}(g) = \{x \mid x \neq -2 \text{ and } x \neq 11\} = \mathbb{R} \setminus \{-2, 11\}$

$= (-\infty, -2) \cup (-2, 11) \cup (11, \infty)$

$\mathcal{D}(f) = \{x \mid x \geq 7\}$

$x - 7 \geq 0$

$x \geq 7$

$\mathcal{D}(f \circ g) =$

$\{x \mid x \neq -2 \text{ and } x \neq 11 \text{ and } \frac{1}{(x+2)(x-11)} \geq 7\}$

Nov 8-8:26 AM

How to solve $\frac{1}{(x+2)(x-11)} \geq 7$?

1. Solve "="
2. Sign Pattern
3. Analyze "≥"

$$\frac{1}{(x+2)(x-11)} = 7$$

$$1 = 7(x+2)(x-11) = 7(x^2 - 9x - 22)$$

$$= 7x^2 - 63x - 154 = 1$$

$$7x^2 - 63x - 155 = 0$$

$a=7, b=-63, c=-155$

$$b^2 - 4ac = (-63)^2 - 4(7)(-155)$$

$$= 3969 + 4340$$

$$= 8309 \rightsquigarrow$$

$$\sqrt{8309}$$

155
28

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37

$8309 \div 7 = 1187$

$37^2 = 1369 > 1187$
Done looking for prime factors.

$$x = \frac{63 \pm \sqrt{8309}}{2(7)} = \frac{63 \pm \sqrt{8309}}{14}$$

Test 1000 :

$$\frac{1}{(x+2)(x-11)} \geq 7 \qquad \frac{1}{(2)(-11)} \geq 7 \; ?$$

$$\frac{1}{(1002)(989)} \geq 7 \; ? \quad \text{No}$$

We'll go back

$$\frac{1}{(x+2)(x-11)} \geq 7$$