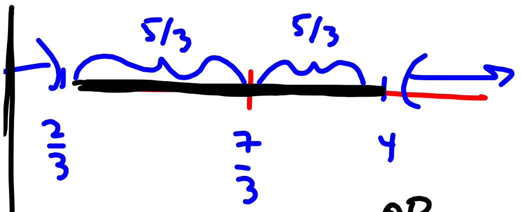
$|3x-7| > 5$

$|3(x-\frac{7}{3})| = 3|x-\frac{7}{3}| > 5$

$\underbrace{|x-\frac{7}{3}|}_{\text{Distance from } x=\frac{7}{3}} > \frac{5}{3}$

An intuitive, "how far from the middle" take.



OR

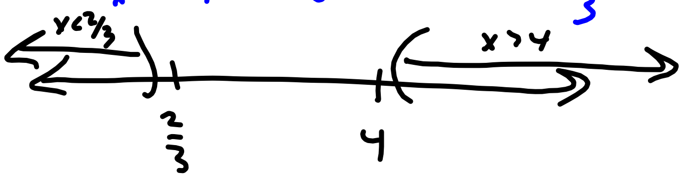
$x \in (-\infty, \frac{2}{3}) \cup (4, \infty)$

$|3x-7| > \frac{5}{3}$

$\boxed{3x-7 > 5}$ OR $3x-7 < -5$

$3x > 12$ OR $3x < 2$

$x > 4$ OR $x < \frac{2}{3}$



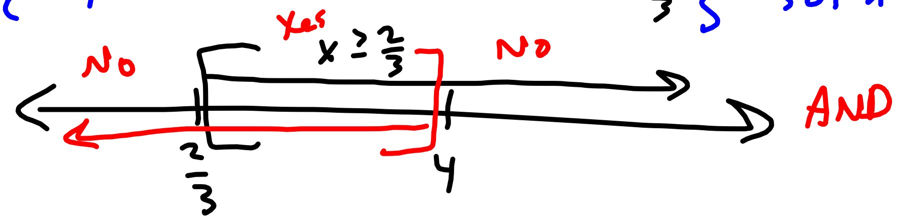
$(-\infty, \frac{2}{3}) \cup (4, \infty)$

$|3x-7| \le 5$ [|] $\frac{7}{3}$

$3x-7 \le 5$ AND $3x-7 \ge -5$

$3x \le 12$ $3x \ge 2$

$\{x \mid x \le 4$ AND $x \ge \frac{2}{3}\}$ sol'n set



$x \in \left[\frac{2}{3}, 4\right]$ Interval (sol'n set, also)

Finish Geometric Series
Discuss "toolbox"
Bring old tests to class.
Anything wrong? Fix it! Learn it!
Nobody (almost) checking old test solutions.
Tests-U-Took

Test 4 questions?

GRAPHING

0. Basic Function
1. Vertical stretch B
2. Horizontal stretch C

---

3. Horizontal shift A
4. Vertical Shift

$2\cdot 4^{x-3} - 9$

0. 4^x
1. $2\cdot 4^x$ $\quad 4^{x-3}$
3. $2\cdot 4^{x-3}$
4. $2\cdot 4^{x-3} - 9$

$2\cdot 4^{-3x-9} - 9$

$-3x-9$
$= -3(x+3)$

Lines

$y = 4^x$

$2y = 2\cdot 4^x$

0. 4^x $\quad (1,4)$
1. $2\cdot 4^x$ $\quad (1,8)$
2. $2\cdot 4^{-3x}$ $\quad (-\frac{1}{3}, 8)$
3. $2\cdot 4^{-3(x+3)}$ $\quad (-\frac{10}{3}, 8)$ $\longleftrightarrow$ $-\frac{1}{3} - 3 = \frac{-1-9}{3} = -\frac{10}{3}$
4. $2\cdot 4^{-3(x+3)} - 9$ $\quad (-\frac{10}{3}, -1)$

$2(-3x-9)^2 - 9$

$\sqrt{x}$ $\quad 2\sqrt{-3x-9} - 9$ $\quad (4,2)$

$= 2\sqrt{-3(x+3)} - 9$

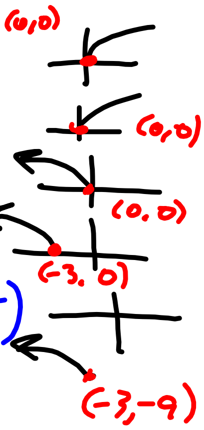
$\sqrt{x}$ $\quad (4,2)$

$2\sqrt{x}$ $\quad (4,4)$

$2\sqrt{-3x}$ $\quad (-\frac{4}{3}, 4)$

$-\frac{4}{3} - \frac{9}{3} = -\frac{13}{3}$ $\quad 2\sqrt{-3(x+3)}$ $\quad (-\frac{13}{3}, 4)$

$2\sqrt{-3(x+3)} - 9$ $\quad (-\frac{13}{3}, -5)$



$g(x) = 7x^2 - 21x + 11 = a(x-h)^2 + K$

$a = 7, b = -21, c = 11$

$\frac{44}{4} - \frac{63}{4} = -\frac{19}{4}$

old-school

$g(x) = 7\left(x^2 - 3x + \left(\frac{3}{2}\right)^2\right) + 11 - 7\left(\frac{9}{4}\right)$

$= 7\left(x - \frac{3}{2}\right)^2 - \frac{19}{4}$

$(h, K) = \left(\frac{3}{2}, -\frac{19}{4}\right)$

Cheat

$-\frac{b}{2a} = -\frac{-21}{2(7)} = \frac{21}{14} = \frac{3}{2} = h$

$g\left(-\frac{b}{2a}\right) = 7\left(\frac{3}{2}\right)^2 - 21\left(\frac{3}{2}\right) + 11$

$= 7\left(\frac{9}{4}\right) - \frac{63}{2} + 11$

$= \frac{63}{4} - \frac{126}{4} + \frac{44}{4}$

$= \frac{107 - 126}{4} = -\frac{19}{4} = K$

$(h, K) = \left(\frac{3}{2}, -\frac{19}{4}\right)$

$g(x) = a(x-h)^2 + K$

$= 7\left(x - \frac{3}{2}\right)^2 - \frac{19}{4}$

Recall Geometric growth

Exponential growth plus immigration.

Saving money for college.

$$\underbrace{\overset{1}{a} + \overset{2}{ar} + \overset{3}{ar^2} + ar^3 + \dots + ar^{n-1}}_{n \text{ terms}} = S_n$$

= "n^{th} partial sum in Calc II."

we derive the formula for S_n

$$S_n = \sum_{k=1}^{n} a \cdot r^{k-1}$$

$r^{n-1} \cdot r^1 = r^{n-1+1} = r^n$

$$S_n = a + ar + ar^2 + ar^3 + \dots + ar^{n-1}$$

$$-(rS_n = ar + ar^2 + ar^3 + ar^4 + \dots + ar^n)$$

$$S_n - rS_n = a - ar^n$$

$$S_n(1-r) = a(1-r^n)$$

$$\boxed{S_n = \frac{a(1-r^n)}{1-r}}$$

$$\sum_{k=1}^{4} 3 \cdot 2^{k-1} = 3 \cdot 2^0 + 3 \cdot 2^1 + 3 \cdot 2^2 + 3 \cdot 2^3$$

$= 3 + 6 + 12 + 24 = 45$

$a = 3, \ r = 2$

$$S_4 = \frac{a(1-r^4)}{1-r} = \frac{3(1-2^4)}{1-2} = \frac{3(1-16)}{-1} = \frac{3(-15)}{-1}$$

$$= \frac{-45}{-1} = 45$$

If r is smaller than 1 in absolute value, then

$$\sum_{k=1}^{\infty} a \cdot r^{k-1}$$ is a real number!

$$\sum_{k=1}^{\infty} 2 \cdot \left(\frac{1}{3}\right)^{k-1}$$ converges $$\sum_{k=1}^{\infty} 19 \cdot \left(-\frac{3}{4}\right)^{k-1}$$ converges

This is because $\left(\frac{1}{3}\right)^{10}, \left(\frac{1}{3}\right)^{11}, \left(\frac{1}{3}\right)^{12}, \ldots \left(\frac{1}{3}\right)^{10000}$ gets vanishingly small.

and so $$2\left(\frac{1-\left(\frac{1}{3}\right)^n}{1-\frac{1}{3}}\right) \xrightarrow{n \to \infty} 2\left(\frac{1}{1-\frac{1}{3}}\right)$$

$$\sum_{k=1}^{\infty} 2\left(\frac{1}{3}\right)^{k-1} = 2\left(\frac{1}{\frac{2}{3}}\right) = 2\left(\frac{3}{2}\right) = 3 \;!$$

$$2 + \frac{2}{3} + \frac{2}{9} + \frac{2}{27} + \cdots + \frac{2}{3^{n-1}} + \cdots$$

Nov 19-8:45 AM

$9 + .9 + .09 + \dots + .0000009$

$= 9.9999999$

$a = 9$

$r = \frac{.9}{9} = \frac{.09}{.9} = \frac{1}{10}$ OR $.1$

$n = ?$ $\quad .0000009 = 9 \times .1^{n-1}$

we want to find the n here.

$n-1$	
0	9
1	.9
2	.09
3	.009
4	.0009
5	.00009
6	.000009
7	.0000009

$n-1 = 7$

$n = 8$

$$9\left(\frac{1-r^8}{1-r}\right)$$

$$= 9\left(\frac{(1-.1^8)}{1-.1}\right) = 9\,\frac{(1-.1^8)}{.9}$$

$$= 10\,(1-.1^8)$$

$=$

we'll play with one or two of those, next time.