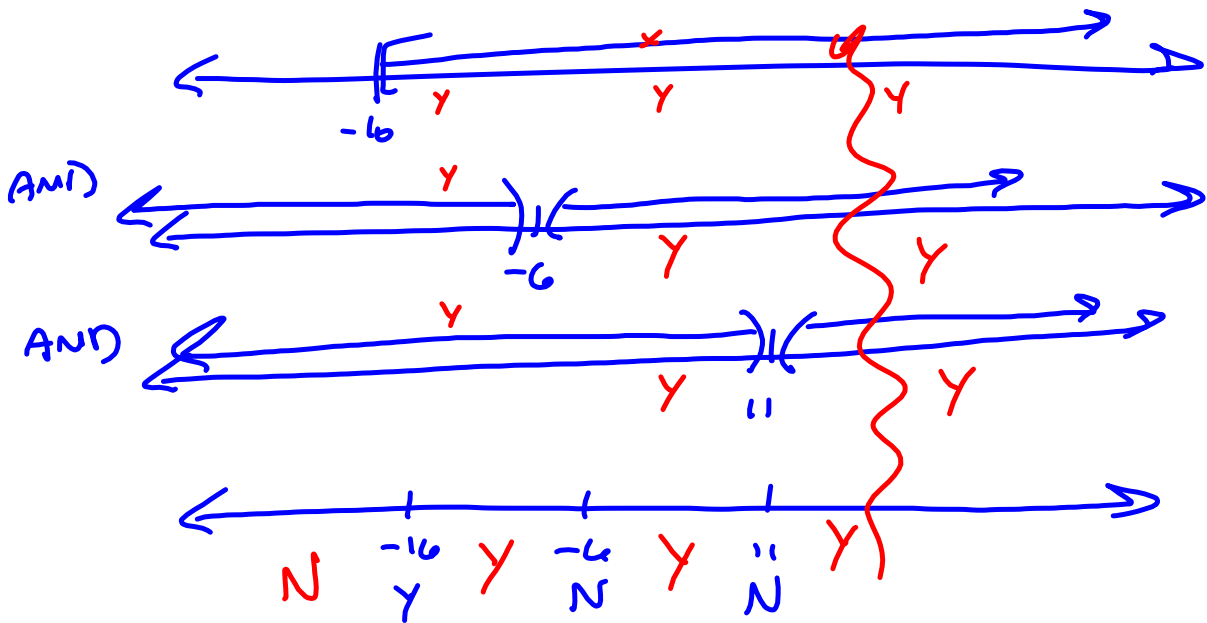
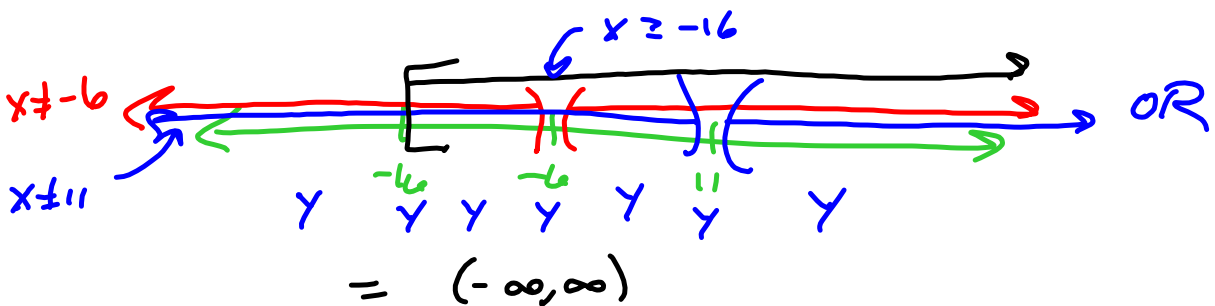
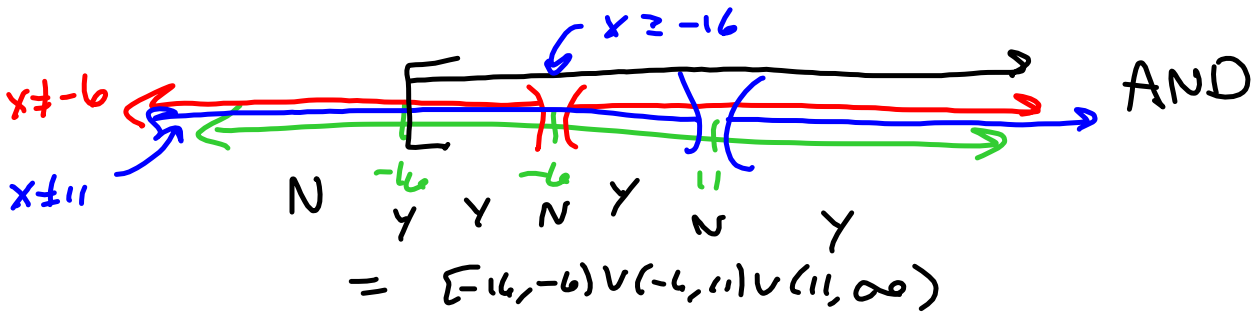


$$D\left(\frac{f}{g}\right) = \{x \mid x \in D(f) \text{ and } x \in D(g) \text{ and } g(x) \neq 0\}$$

$$= \{x \mid x \geq -16 \text{ and } x \in \mathbb{R} \text{ and } x \neq -6, 11\}$$



$$[-16, -6) \cup (-6, 11) \cup (11, \infty)$$



centered @ (0,0,0), <sup>sphere!</sup>  $r = \sqrt{133}$

$$\sqrt{(x-x_0)^2 + (y-y_0)^2 + (z-z_0)^2} = D$$

Distance in 3-D.

$$x^2 + y^2 + z^2 + w^2 = 16$$

$$x + y = 7 \quad \text{Line in 2-space}$$

$$x + y + z = 7 \quad \text{Plane in 3-space}$$

$$x + y + z + w = 7 \quad \text{Hyperplane in 4-space.}$$

5.3 #59

 $(9, 4, -6)$   
 $(4, 9, -6)$ 

$$xy = z^2$$

$$x + y + z = 7 \Rightarrow y = 7 - x - z$$

$$x^2 + y^2 + z^2 = 133$$

$$x(7 - x - z) = z^2 \Rightarrow \underline{7x - x^2 - xz = z^2}$$

$$x^2 + (7 - x - z)^2 + z^2 = 133 \Rightarrow$$

$$x^2 + x^2 + 2xz + z^2 - 2x - 2z = 133$$

$$2x^2 + 2xz + z^2 - 2x - 2z = 133$$

$$7x - x^2 - xz = z^2$$

2 equations  
2 unknowns.

New system.  
Bleh.

$$(7 - x - z)^2 = (x + z - 7)^2 = (a - b)^2 = a^2 - 2ab + b^2$$

$$a = x + z, b = 7$$

$$\equiv (x + z)^2 - 2(x + z) + 7^2$$

$$= x^2 + 2xz + z^2 - 2x - 2z + 49$$

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

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

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

$(h, K) = \text{vertex}$

$$x^2 + 4x - 5 = x^2 + 4x + 2^2 - 4 - 5$$

$$= (x+2)^2 - 9$$

$$a=1, b=4, c=-5$$

$$\Rightarrow -\frac{b}{2a} = -\frac{4}{2} = -2 = h$$

$$f(h) = (-2)^2 + 4(-2) - 5$$

$$= 4 - 8 - 5$$

$$= -9 = K$$

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

$$= 1(x+2)^2 + -9$$

$$7x^2 - 5x + 11$$

$$a=7, b=-5, c=11$$

$$-\frac{b}{2a} = -\frac{(-5)}{2(7)} = \frac{5}{14} = h$$

$$f\left(-\frac{b}{2a}\right) = 7\left(\frac{5}{14}\right)^2 - 5\left(\frac{5}{14}\right) + 11$$

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

$$\frac{7(25)}{196} - \frac{25}{14} \cdot \frac{14}{14} + \frac{11}{1} \cdot \frac{196}{196}$$

$$= \frac{175 - 350 + 2156}{196}$$

$$= \frac{1981}{196} = \frac{7 \cdot 283}{2^2 \cdot 7^2} = \frac{283}{28}$$

$$14 \cdot 14 = 2^2 \cdot 7^2$$

$$7 \left| \begin{array}{r} 1981 \\ \underline{283} \end{array} \right.$$

$$7\left(x - \frac{5}{14}\right)^2 + \frac{283}{28}$$

$$\begin{array}{r} 196 \\ 196 \\ \hline 2156 \\ - 350 \\ \hline 1806 \\ + 175 \\ \hline 1981 \end{array}$$

$$5x^2 + 7x - 10 = f(x)$$

$$-\frac{b}{2a} = \frac{-7}{2(5)} = \frac{-7}{10}$$

$$\begin{aligned} f\left(-\frac{7}{10}\right) &= 5\left(-\frac{7}{10}\right)^2 + 7\left(-\frac{7}{10}\right) - 10 \\ &= \frac{5(49)}{100} - \frac{49}{10} - 10 = \frac{49}{20} - \frac{49}{10} \cdot \frac{2}{2} - \frac{10}{1} \cdot \frac{20}{20} \\ &= \frac{49 - 98 - 200}{20} = \frac{-249}{20} \end{aligned}$$

$$5\left(x + \frac{7}{10}\right)^2 + \frac{-249}{20}$$

$$5x^2 + 7x - 10$$

$$\begin{aligned} &= 5\left(x^2 + \frac{7}{5}x + \left(\frac{7}{10}\right)^2\right) - 10 - 5\left(\frac{49}{100}\right) \\ &\quad \begin{array}{l} \nearrow \text{See? Times 5!} \nearrow \\ \text{See? Times 5!} \end{array} \end{aligned}$$

$$\begin{aligned} -10 - \frac{49}{20} &= \frac{-200}{20} - \frac{49}{20} \\ &= \frac{-249}{20} \end{aligned}$$

$$= 5\left(x + \frac{7}{10}\right)^2 - \frac{249}{20}$$