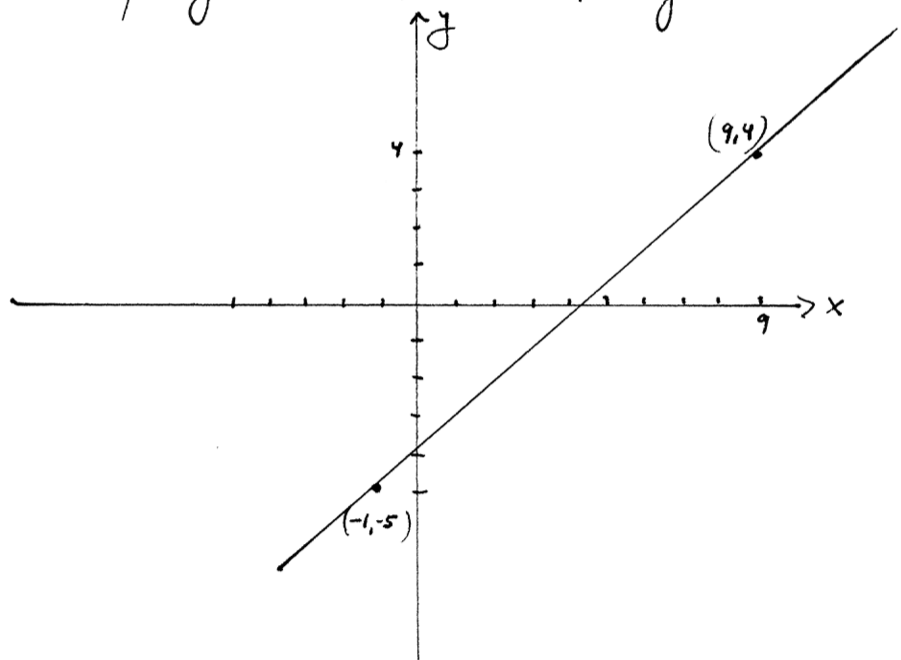
Solutions to the Math Exercises on pages 276/277 in your textbook

(1)



a line through (9,4) & (-1, -5)

$\Rightarrow$ the slope $\underline{m}$ of the above line is

$$m = \frac{-5-4}{-1-9} = \frac{-9}{-10} = \frac{9}{10}$$

(2) a line through (4,5) & (7,13)

$\Rightarrow$ the slope m of the line is $m = \frac{13-5}{7-4} = \frac{8}{3}$

$\Rightarrow$ the equation (eqn) of the line is:

$$y-5 = \frac{8}{3}(x-4)$$

or, $3y - 15 = 8x - 32$

$\Rightarrow$ $\boxed{8x - 3y = 17}$ is the eqn of the line through (4,5) & (7,13)

③ a line through $(-4,-8)$ & $(2,10)$

$\Rightarrow$ the slope m of the line is:

$$m = \frac{10-(-8)}{2-(-4)} = \frac{18}{6} = 3$$

$\Rightarrow$ a point-slope form of an eqn of the line is:

$$y-10 = 3(x-2)$$

$$\Rightarrow y-10 = 3x-6$$

$$\Downarrow$$

$\boxed{3x-y=-4}$ is an eqn of the line through $(-4,-8)$ & $(2,10)$

④

$m=-3$

$(-2,5)$

$\Rightarrow$ point-slope form of eqn of a line:

$$y-5 = -3(x-(-2))$$

$$y-5 = -3(x+2)$$

$$y-5 = -3x-6$$

$$\Rightarrow \boxed{3x+y=-1}$$

(5) $(4, -3)$

& $\parallel$ to $7x - 3y = 8$

$$7x - 3y = 8$$
$$\Downarrow$$
$$3y = 7x - 8$$
$$\Downarrow$$
$$y = \frac{7}{3}x - \frac{8}{3}$$ $\Rightarrow$ the slope of $7x - 3y = 8$ is $\frac{7}{3}$

$\Rightarrow$ the wanted eqn is:

$$y - (-3) = \frac{7}{3}(x - 4)$$

i.e., $y + 3 = \frac{7}{3}(x - 4)$

$$3y + 9 = 7x - 28$$
$$\Downarrow$$
$$\boxed{7x - 3y = 37}$$

(6) We can argue from the drawing that if two lines are parallel, they have the same slopes, since the two triangles on the picture are congruent (the same).

(7) $(4,7)$ & $(-2,5)$

$\Rightarrow$ the distance between the points $(4,7)$ & $(-2,5)$ is:

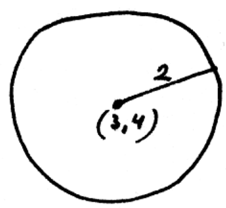
$$\sqrt{(-2-4)^2+(5-7)^2} = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$$

(8) $(-1,-2)$ & $(-4,-7)$

$\Rightarrow$ the distance between the points $(-1,-2)$ & $(-4,-7)$ is:

$$\sqrt{(-1+4)^2+(-2+7)^2} = \sqrt{9+25} = \sqrt{34}$$

(9)



$\Rightarrow$ the eqn of the circle of radius 2 centered at $(3,4)$

is:

$$\boxed{(x-3)^2+(y-4)^2 = 2^2}$$

(10) the eqn of a circle or radius 16 centered at $(1,3)$

is:

$$(x-1)^2+(y-3)^2 = 16^2$$

i.e., $\boxed{(x-1)^2+(y-3)^2 = 256}$

(11) $x^2+6x+y^2+10y-2=0$

complete the squares:

$$\underbrace{x^2+6x+9}-9+\underbrace{y^2+10y+25}-25-2=0$$

$$(x+3)^2-9+(y+5)^2-27=0$$

$$(x+3)^2+(y+5)^2=36$$

$$\underbrace{(x+3)^2+(y+5)^2=6^2}$$

$\Downarrow$

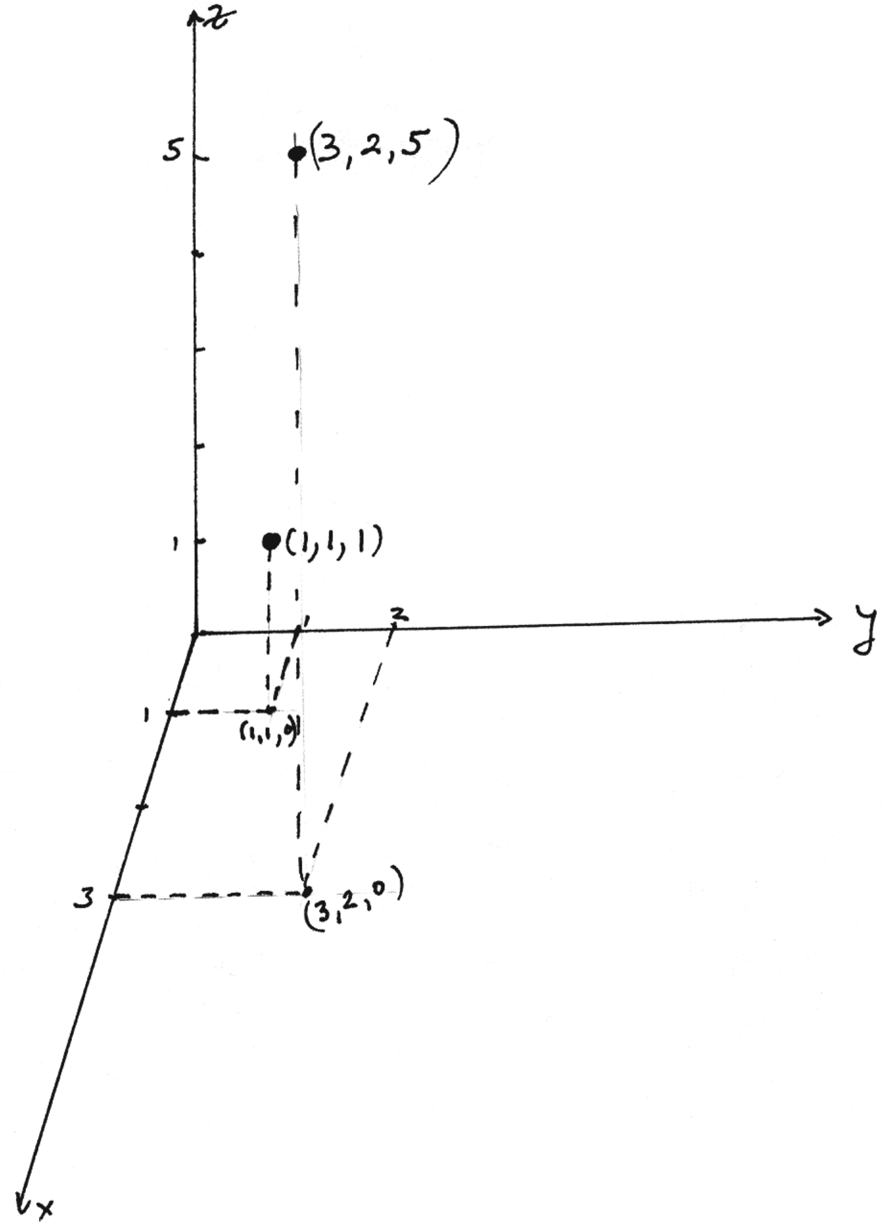
the radius is 6

& the center is $(-3,-5)$

(12) $(1,1,1)$ & $(3,2,5)$

the distance between $(1,1,1)$ & $(3,2,5)$ is:

$$\sqrt{(3-1)^2+(2-1)^2+(5-1)^2}=\sqrt{4+1+16}=\sqrt{21}$$



(13) $(1,0,0)$

$(0,1,0)$

$(0,0,1)$

the lengths of the sides of the triangle are the distances in 3-space between any two of the above points, namely:

the distance between $(1,0,0)$ & $(0,1,0)$ is

$$\sqrt{(0-1)^2+(1-0)^2+(0-0)^2} = \sqrt{1+1} = \sqrt{2} \; ;$$

the distance between $(1,0,0)$ & $(0,0,1)$ is

$$\sqrt{(1-0)^2+(0-0)^2+(0-1)^2} = \sqrt{1+1} = \sqrt{2} \; ;$$

the distance between $(0,1,0)$ & $(0,0,1)$ is

$$\sqrt{(0-0)^2+(1-0)^2+(0-1)^2} = \sqrt{1+1} = \sqrt{2}$$

$\Rightarrow$ the lengths are $\sqrt{2}, \sqrt{2}, \sqrt{2}$