7a

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III - Cs

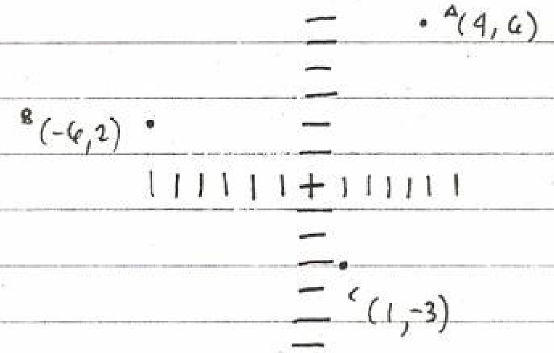
10/10

Reviewed

AUG. 11, 2008
HW/SW/Q

7a.)
FIND AN EQUATION OF THE CIRCLE THAT PASSES THROUGH THE POINTS

a.) $A(4,6)$ $B(-6,2)$ $C(1,-3)$



EQUATION OF LINE OF POINTS A & B

$\rightarrow$ $y-y_1 = \frac{y_2-y_1}{x_2-x_1}(x-x_1)$

to $y-k = \frac{q-k}{p-h}(x-h)$

SO, LET (h,k) & (p,q)
$\quad 4,6 \qquad -6,2$

$y-6 = \frac{2-6}{-6-4}(x-4)$

$y-6 = \frac{2}{5}(x-4)$

$y = \frac{2}{5}x - \frac{8}{5} + 6$

$y = \frac{2}{5}x + \frac{22}{5}$

$y = 0.4x + 4.4$

EQUATION OF LINE OF POINTS A & C

LET (h,k) & (p,q)
$\quad 4,6 \qquad 1,-3$

$y-6 = \frac{-3-6}{1-4}(x-4)$

$y-6 = 3(x-4)$

$y = 3x-6$

7a

MIDPOINT OF LINE AB

$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$\left(\frac{h+p}{2}, \frac{k+g}{2}\right)$$

$$\left(\frac{4+-6}{2}, \frac{6+2}{2}\right)$$

$$(-1, 4)$$

MIDPOINT OF LINE AC

$$\left(\frac{4+1}{2}, \frac{6+-3}{2}\right)$$

$$\left(\frac{5}{2}, \frac{3}{2}\right)$$

$$(2.5, 1.5)$$

LINE $\perp$ to $\overline{AB}$

$$y = \frac{2}{5}x + \frac{22}{5}$$

$$y-4 = -\frac{5}{2}(x+1)$$

$$y = -\frac{5}{2}x + -\frac{5}{2} + 4$$

$$y = -\frac{5}{2}x + \frac{3}{2}$$

LINE $\perp$ TO AC

$$y = 3x-6$$

$$y - \frac{3}{2} = -\frac{1}{3}\left(x - \frac{5}{2}\right)$$

$$y = -\frac{1}{3}x + \frac{5}{6} + \frac{3}{2}$$

$$y = -\frac{1}{3}x + \frac{7}{3}$$

$\ell_{\perp AB} \cap \ell_{\perp AC}$

$$y = -\frac{5}{2}x + \frac{3}{2}$$
$$-y = \frac{1}{3}x - \frac{7}{3}$$

$$0 = -\frac{13}{6}x - \frac{5}{6}$$
$$+\frac{5}{6} = -\frac{13}{6}x$$

$$x = \frac{-5}{13}$$

$$x = -\frac{2}{5}y + \frac{3}{5}$$
$$-x = 3y - 7$$

$$0 = \frac{13}{5}y - \frac{32}{5}$$
$$\frac{32}{5} = \frac{13}{5}y$$

$$y = \frac{32}{13}$$

CIRCUMCENTER $\left(\overset{h}{\frac{-5}{13}}, \overset{k}{\frac{32}{13}}\right)$

POINT A $(\underset{x}{4}, \underset{y}{6})$

$$\left(4x + \frac{5}{13}\right)^2 + \left(6y - \frac{32}{13}\right)^2 = r^2$$

$$r^2 = \frac{5365}{169} \; ; \; r = 5.634320024$$

$$\boxed{\left(x+\frac{5}{13}\right)^2 + \left(y-\frac{32}{13}\right)^2 = \frac{5365}{169}}$$

ANGELES, Neil Patrick 2
SALUNDO, Elysse, S. 29

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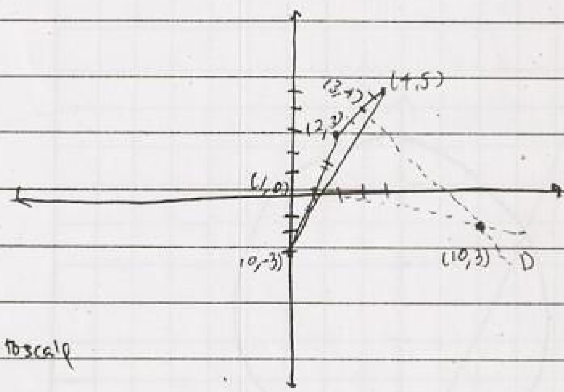
B C A

7b.) passes through points $(2,3)$, $(4,5)$ and $(0,-3)$



not to scale

$AB = \sqrt{(0-2)^2 + (-3-3)^2}$

$= \sqrt{4+36}$

$= \sqrt{40} = 2\sqrt{10}$

$y - y_1 = \left(\frac{y_2 - y_1}{x_2 - x_1}\right)(x - x_1)$

$y - 3 = \frac{(-3-3)}{(0-2)}(x-2)$

$y - 5 = \frac{-6}{-2}(x-2)$

$y - 3 = 3x - 6$

$y = 3x - 3$

$M : \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$M'_{AB} \left(\frac{(2+0)}{2}, \frac{3+-3}{2}\right)$

$M : = (\underset{x_1}{1}, \underset{y_1}{0})$

$BC = \sqrt{(2-4)^2 + (3-5)^2}$

$= \sqrt{4+4}$

$= \sqrt{8}$

$= 2\sqrt{2}$

$y - 3 = \frac{(5-3)}{(4-2)}(x-3)$

$y - 3 = y - 2$

$y = x + 1$

$M_{BC} : \left(\frac{4+2}{2}, \frac{5+3}{2}\right)$

$M_{BC} : (3,4)$

BD = $\sqrt{\ }$

eq'n of $\perp$ →

AB $y - \cancel{0} = -1/3\,(x - \cancel{1})$

$y = -1/3\,x + 1/3$

BC

$y - 4 = -1(x-3)$

$y = -x + 7$

$-1/3\,x + 1/3 = -x + 7$

$2/3\,x = 20/3$

$x = 10$

$y = -3$

$AD = \sqrt{(10-0)^2 + (-3+3)^2}$

$= \sqrt{100}$

$(x-10)^2 + (y+3)^2 = 100$

Math4 Prob Set # 8

Arcega, Jose Mari
Perlada, Micaela

II - Cesium

8) $x^2 + y^2 = 5y$, $(-2, 1)$

$x^2 + y^2 - 5y = 0$

$x^2 + y^2 + 5y + \frac{25}{4} = \frac{25}{4}$

$x^2 + (y - 5/2)^2 = 25/4$

$\therefore$ center $(0, 5/2)$

* get the slope

$m = \dfrac{\frac{5}{2} - 1}{0 - (-2)} = \frac{3}{4}$

$y = \frac{3}{4}x + \frac{5}{2}$

* get the $\perp$

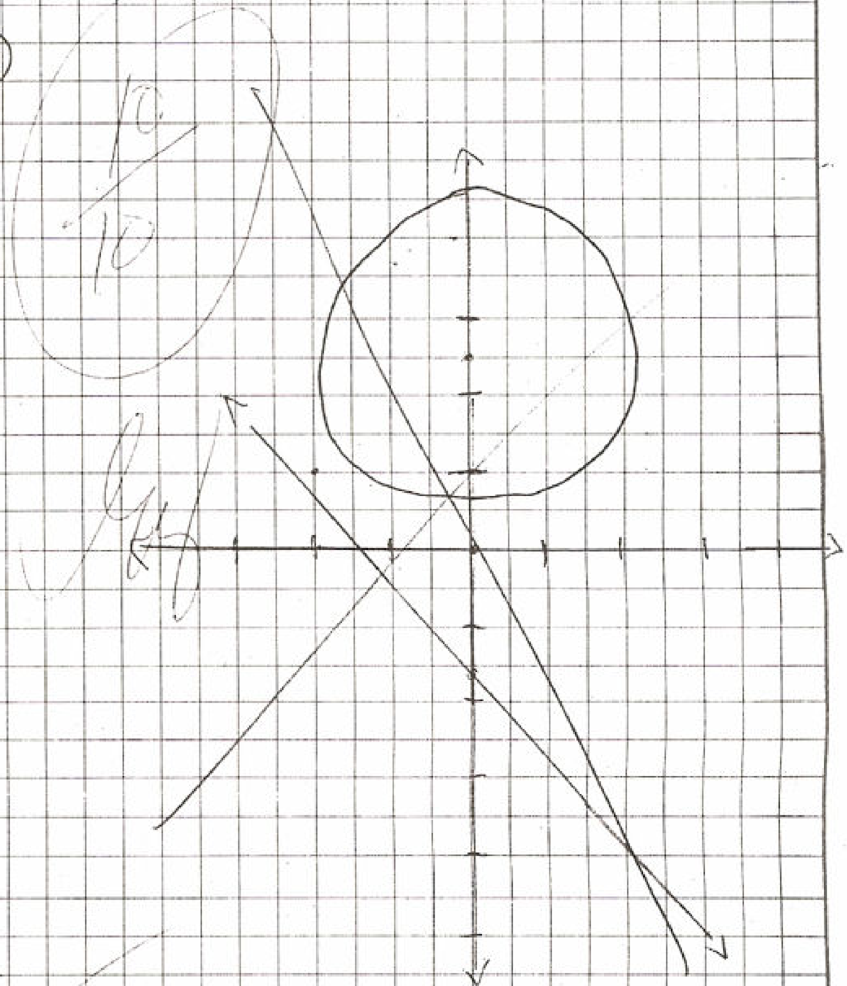
$y = \frac{-4}{3}x + b$

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

$1 = \frac{8}{3} + b$

$b = -\frac{5}{3}$

$\boxed{y = \frac{-4}{3}x - \frac{5}{3}}$



Joannes Luke Asis
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III Cesium

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#9

Given: Find the equation of the circle touching the circle $x^2+y^2+2x-6y+5=0$ at $(1,2)$ and passing through $(4,1)$

Circle 1: $x^2+y^2+2x-6y+5=0$

$(x^2+2x+1)+(y^2-6y+9) = 5$

$(x+1)^2+(y-3) = 5$

$C: (-1,3)$

radius: $\sqrt{5}$

Circle 2,

- First equation

$(1-h)^2+(2-k)^2 = r^2$

- second eq'n $(4-h)^2+(1-k) = r^2$

- $(1-h)^2+(2-k)^2 = (4-h)+(1-k)$

$1-2h+\cancel{h^2}+4-4k+k^2 = 16-8h+h^2+1-2k+\cancel{k^2}$

$6h-2k = 12$

$\boxed{3h-k = 6}$

- theorem:

$m = \frac{2-3}{1+1} = \frac{-1}{2}$

$\frac{-1}{2} = \frac{k-2}{h-1}$

$-h+1 = 2k-4$

$-h-2k = -5$

Third eq'n $\boxed{h = 5-2k}$

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Substitute.

$$3(5-2k) - k = 6$$

$$15 - 6k - k = 6$$

$$15 - 7k = 6$$

$$15 - 6 = 7k$$

$$9 = 7k$$

$$\boxed{\frac{9}{7} = k}$$

$$\cancel{3\left(\frac{9}{7}\right)} \quad 3h - \frac{9}{7} = 6$$

$$3h = \frac{42}{7} + \frac{9}{7}$$

$$3h = \frac{51}{7}$$

$$h = \frac{51}{7}\left(\frac{1}{3}\right)$$

$$\boxed{h = \frac{17}{7}}$$

$$\cancel{\left(x - \frac{17}{7}\right)^2 +}$$

radius.

$$\left(1 - \frac{17}{7}\right)^2 + \left(2 - \frac{9}{7}\right)^2 = r^2 \qquad \frac{100}{49} + \frac{25}{49} = r^2$$

$$\left(\frac{7}{7} - \frac{17}{7}\right)^2 + \left(\frac{14}{7} - \frac{9}{7}\right)^2 = r^2 \qquad \frac{125}{49} = r^2$$

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

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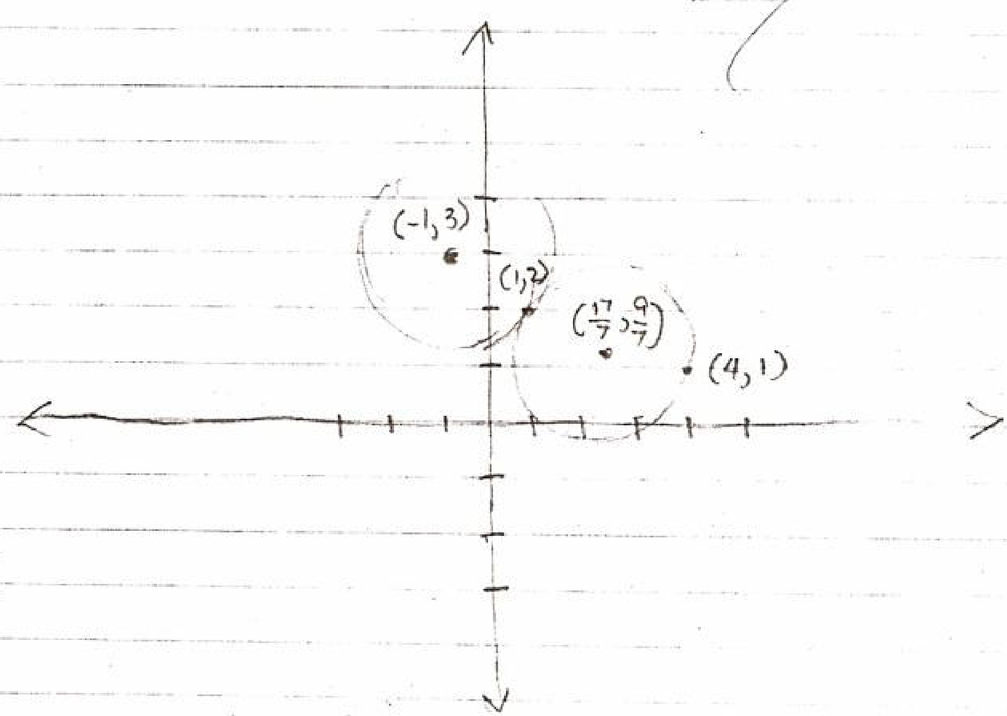
Problem # 9

$$(x+1)^2 + (y-3)^2 = 5$$

$$\boxed{\left(x-\frac{17}{7}\right)^2 + \left(y-\frac{9}{7}\right)^2 = \frac{125}{49}}$$



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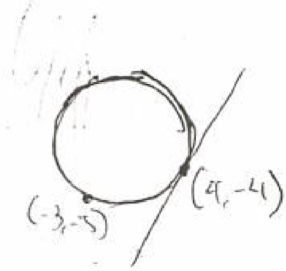
Cesium 26 and 5

Mendoza and Astrologo

10) Given: Eq'n of line: $4x-3y=28$

point of tangency: $(4,-4)$

point in the circle: $(-3,-5)$



Find: Eq'n of Circle

1) $4x-3y=28$, p.t. $(4,-4)$, $(-3,-5)$

perpendicular to $4x-3y=28$:

$3y=4x-28$

$y=\frac{4}{3}x-\frac{28}{3} \to$ slope $=-\frac{3}{4}$, p.t. $4,-4$

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

$y+4=-\frac{3}{4}x+3$

$y=-\frac{3}{4}x-1$

2) Eq'n of chord p.t. $(4,-4)$ and $(-3,-5)$

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

$y+4=\frac{-1}{-7}(x-4)$

$y+4=\frac{1}{7}x-\frac{4}{7}$

$y=\frac{1}{7}x-\frac{32}{7}$

Eq'n of line $\perp$ to $y=\frac{1}{7}x-\frac{32}{7}$

$(\Delta x, \Delta y):\left(\frac{4-3}{2}, \frac{-4-5}{2}\right)$ or $\left(\frac{1}{2},-\frac{9}{2}\right)$

$y+\frac{9}{2}=-7\left(x-\frac{1}{2}\right)$

$y+\frac{9}{2}=-7x+\frac{7}{2}$

$y=-7x-1$ $\to$ $y=-\frac{3}{4}x-1 \cap y=-7x-1$

$x=0$, $y=7(0)-1$

$y=-1$ $\to C(0,-1)$

radius:

$(0-4)^2+(-1+4)^2=d^2$

$(-4)^2+(3)^2=d^2$

$16+9=d^2$

$25=d^2$

Eq'n of circle:

$$\boxed{(x-0)^2+(y+1)^2=25}$$

Lim, Rachelle A.
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10/10 9/11

11. Find the equation of the tangent line to $x^2+y^2-2x-8y+15=0$ and parallel to $x-y=9$

eq of the circle:
$$x^2+y^2-2x-8y+15=0$$
$$(x^2-2x+1)+(y^2-8y+16)=-15+16+1$$
$$(x-1)^2+(y-4)^2=2$$
$$C:(1,4),\ r=\sqrt{2}$$

eq of the // line: $y=x-9$, slope: 1

eq. of the line ⊥ to the // line & passing through the center
$$y-4=-(x-1)$$
$$y-4=-x+1$$
$$y=-x+5$$

• pts of tangency
$$y=-x+5 \cap (x-1)^2+(y-4)^2=2$$
$$x=-y+5$$

$$(-y+5-1)^2+(y-4)^2=2$$
$$(-y+4)^2+(y-4)^2=2$$
$$(y^2-8y+16)+(y^2-8y+16)=2$$
$$2y^2-16y+32=2$$
$$y^2-8y+15=0$$
$$(y-3)(y-5)=0;\ y=3 \text{ or } y=5$$

$$y_1=-x_1+5 \qquad y_2=-x_2+5$$
$$3=-x_1+5 \qquad 5=-x_2+5$$
$$x_1=2 \qquad x_2=0$$
$$(2,3) \qquad (0,5)$$

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• equations of the tangent lines

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

$$y=x-2+3$$

$$\boxed{y=x+1}$$

$$y-5=(x-0)$$

$$\boxed{y=x+5}$$

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CN: 7, 24

Bea Clarise Garcia
Llogene de Loyola

$\frac{10}{10}$

12

Given: $(-4,-2)$; $(2,0)$

$5x - 2y = 19 \longleftrightarrow y = \frac{5}{2}x - \frac{19}{2}$

$d^2 = (x - x_1)^2 + (y - y_1)^2$

- $(-4,-2)$; (x,y)
- $(2,0)$; (x,y)
- $(x+4)^2 + (y+2)^2 =$
  $(x-2)^2 + y^2$
- $\cancel{x^2} + 8x + 16 + \cancel{y^2} + 4y + 4 =$
  $\cancel{x^2} - 4x + 4 + \cancel{y^2}$
- $8x + 16 + 4y + 4 = -4x + 4$
- $12x + 4y + 16 = 0$
  $(5x - 2y = 19)2$
- $12x + \cancel{4y} + 16 = 0$
  $10x - \cancel{4y} - 38 = 0$
  $22x = 22$
  $\boxed{x = 1}$
- $y = \frac{5}{2}(1) - \frac{19}{2}$
  $y = \frac{-14}{2} \longleftrightarrow \boxed{-7}$

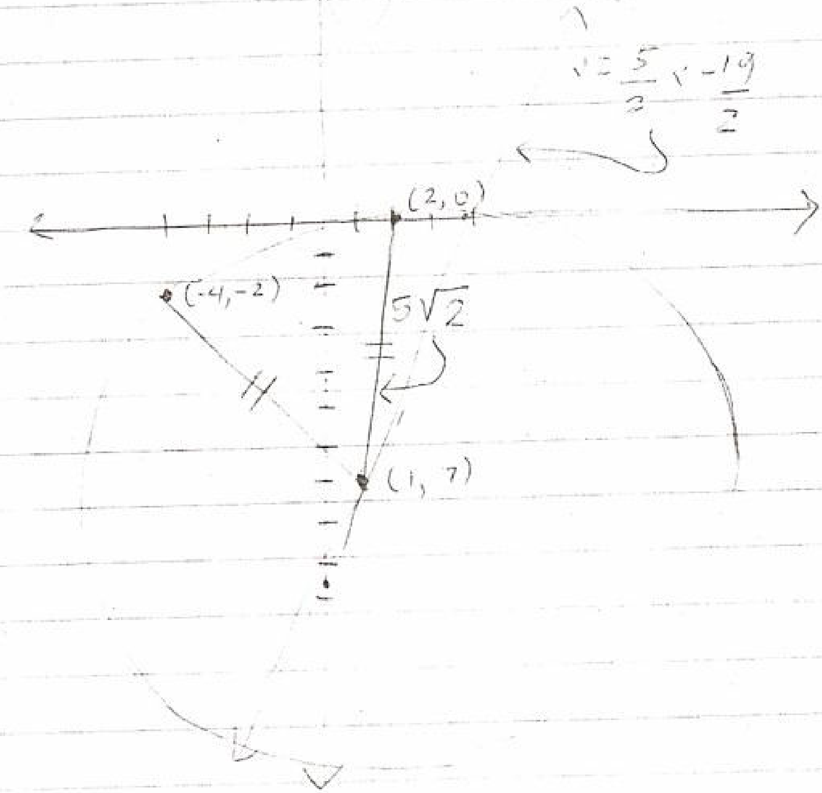
$d = \sqrt{(2-1)^2 + (0+7)^2}$

$d = \sqrt{1 + 49}$

$d = \sqrt{50} \longleftrightarrow \boxed{5\sqrt{2}} = r$

EQN =

$$\boxed{(x-1)^2 + (y+7)^2 = 50}$$



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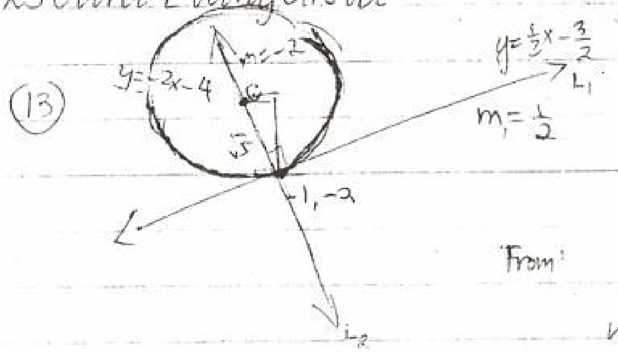
III - Cesium
8 Jash Dizon
23 Cara Evangelista

$\frac{10}{10}$

8 August 2008
Pairwork

(13)



$m_1 = \frac{1}{2}$

Since $L_2 \perp L_1$, $m_2 = -2$

$L_2 = y + 2 = -2(x+1)$

$y = -2x - 4$

Given L_1: $x - 2y = 3$

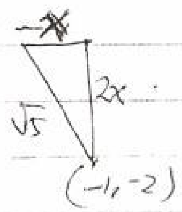
$r = \sqrt{5}$

$P(-1, -2)$

From: $y = -2x - 4$

we get for every $2y$ a ~~one~~ x change.

$m_2 = \frac{-2}{1} = \frac{\Delta y}{\Delta x} = \frac{2x}{-x} = \frac{-2x}{x}$



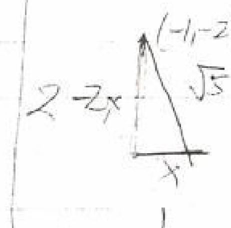
$x^2 + 4x^2 = (\sqrt{5})^2$

$5x^2 - 5 = 0$

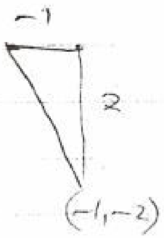
$(x+1)(x-1) = 0$

$x = -1, 1$

$\underline{x = 1}$



$x = 1$



So we get coordinates of center:

$C_1(-2, 0)$ and $C_2(0, -4)$

$\therefore$ S.E. of the circle is

$\boxed{(x+2)^2 + y^2 = 5}$ and $\boxed{x^2 + (y+4)^2 = 5}$

10/10

Justin Dumayag #9

Michelle Co #22

III-Cesium

14. Find the equation of the circle passing through the point (7,9), tangent to the x-axis and has its center on the line $x-y+1=0$

given: point (7,9)

center on $y=x+1$ $C(x, x+1)$

point tangent to x-axis $(x, 0)$

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

[where $r = x+1$ because $x+1$ is the distance from the center to the point tangent to the x-axis]

$$\cancel{2a^2 - 30a + 149 = a^2 + 2a + 1}$$

$$2x^2 - 30x + 113 = x^2 + 2x + 1$$

$$x^2 - 32x + 112 = 0$$

$$(x-4)(x-28) = 0$$

$\therefore$ There are two centers which satisfy the conditions;

$C(4,5)$ and $C(28,29)$

The equations are:

$$(x-4)^2 + (y-5)^2 = 25$$

$$(x-28)^2 + (y-29)^2 = 841$$

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Cs 10, 21

ENDICO, Marxlen

TAN, Bryan

10/10

15.

$2x + y + 15 = 0 \rightarrow y = -2x - 15$

$2x + y - 5 = 0 \rightarrow y = -2x + 5$

to get equation of perpendicular passing through (2,1):

$$y - 1 = \frac{1}{2}(x - 2)$$

negative reciprocal

$$y - 1 = \frac{1}{2}x - 1$$

$$y = \frac{1}{2}x$$

using systems of linear equations:

$y = \frac{1}{2}x$

$2x + y + 15 = 0$

$$\frac{1}{2}x - y = 0$$

$$2x + y = -15$$

$$\frac{5}{2}x = -15$$

$$x = -6$$

$$y = -3$$

∴ the line $y = \frac{1}{2}x$ intersects the line $2x + y + 15 = 0$ at point $(-6, -3)$

∴ $(-6, -3)$ and $(2, 1)$ are endpoints of the circle

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Using distance formula:

$\sqrt{(-6-2)^2 + (-3-1)^2} = \frac{\sqrt{80}}{2} = 4\sqrt{5} \rightarrow$ diameter

radius $= 2\sqrt{5}$

To find the center:

x-coordinate $= \frac{-6+2}{2} = -2$

y-coordinate $= \frac{-3+1}{2} = -1$

$\therefore$ center $= (-2, -1)$

Therefore, the equation of the circle is:

SF: $(x+2)^2 + (y+1)^2 = 20$

GF: $x^2 + y^2 + 4x + 2y - 15 = 0$

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III - C5

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20 SAN JUAN, Marck Darryl

8 August 08

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16) $\odot_1 \rightarrow x^2 + y^2 - 6x + 2y - 15 = 0$

$x^2 - 6x + 9$

$y^2 + 2y + 1$ $= 15 + 10$

$(x-3)^2 + (y+1)^2 = 25$

$C : (3, -1)$ $r = 5$

radius $= \sqrt{(3 - {}^{34}/_{13})^2 + (-1 + {}^{25}/_{13})^2}$

$= \sqrt{1}$

$= 1$

$\therefore \odot_2 \rightarrow (x-3)^2 + (y+1)^2 = 1$

Tangent line $5x + 12y + 10 = 0$

(L_1) $12y = -5x - 10$

$y = \frac{-5x - 10}{12}$

$m = \frac{-5x}{12}$

$\therefore m_2 = \frac{12}{5}$

L_2 $y + 1 = \frac{12}{5}(x - 3)$

$5y + 5 = 12x - 36$

$\times 12 \; 5x + 12y = -10$ L_1

$\times 5 \; -12x + 5y = -41$ L_2

$60x + 144y = -120$

$-60x + 25y = -205$

$169y = -325$

$y = \frac{-25}{13}$

(substitute) $x = \frac{34}{13}$

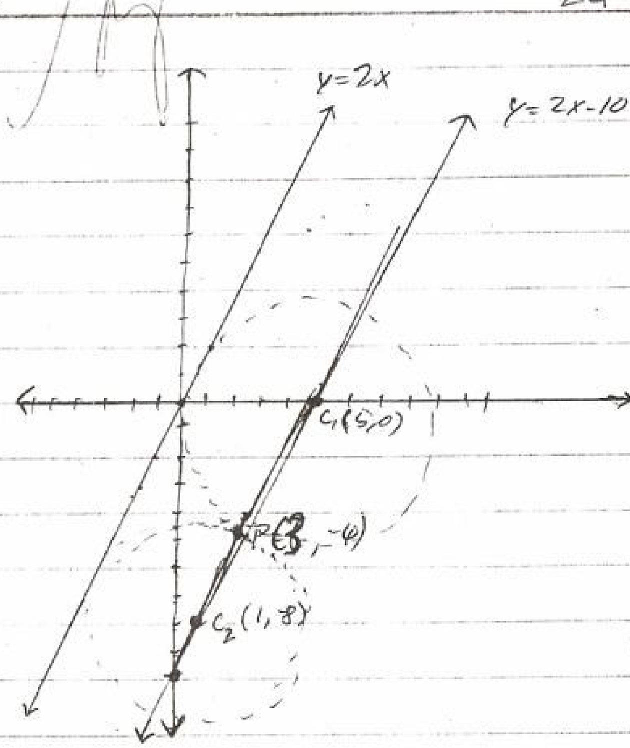
Cs 12, 19
GARCIA, James Rainier M.
PEREZ, Vace Nichole

15 Aug 2008
2Q, Pbs

17. $r = 2\sqrt{5}$

tangent to $y = 2x$

passes through $P(3, -4)$



$(x-h)^2 + (y-k)^2 = r^2$ ... ①

Plug in $P(3,-4)$

$(3-h)^2 + (-4-k)^2 = 20$ ... ②

$\perp$ to $y=2x$ & passes through $P(3,-4)$

$\cancel{y} = 2x - 10$

$k = 2h - 10$ ... ③

③ → ②,

$(3-h)^2 + (-4-2h+10)^2 = 20$

$h^2 - 6h + 9 + (-2h+6)^2 = 20$

$h^2 - 6h + 9 + 4h^2 - 24h + 36 = 20$

$[5h^2 - 30h + 45 = 20] \div 5$

$h^2 - 6h + 9 = 4$

$h^2 - 6h + 5 = 0$

$(h-5)(h-1) = 0$

$h = 5, 1$ ... ④

④ → ③,

$k = 2(5) - 10$ ∪ $k = 2(1) - 10$

$= 10 - 10$ $\quad$ $= 2 - 10$

$k = 0$ $\quad$ $k = -8$ ... ⑤

④ → ① & ⑤ → ①,

$(x-5)^2 + (y-0)^2 = 20$ or $(x-1)^2 + (y+8)^2 = 20$

The circle may be: $(x-5)^2 + y^2 = 20$

or

$(x-1)^2 + (y+8)^2 = 20$

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Palutik Gu, Jef Posrosco

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III - Cs

#18 $x^2+y^2=10$ P(5,5)

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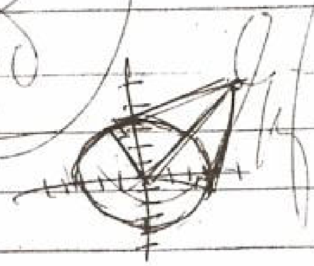

$2\sqrt{10} \to \sqrt{40}$

$\sqrt{10}$ $5\sqrt{10}$

$(x-5)^2+(y-5)^2=40$

$x^2-10x+y^2-10y=-10$

$-10x-10y=-20$

$x+y=2$

$x=2y$

$(2-y)^2+y^2=10$

$y^2-4y+4+y^2=10$

$2y^2-4y-6=0$

$y^2-2y-3=0$

$(y-3)(y+1)=0$

Pt's $(-1,3)$ $\to$ $(5,5)(-1,3)$

$(3,-1)$

$y-5=\left(\frac{3-5}{-1-5}\right)(x-5)$

$y-5=-\frac{2}{6}(x-5)$

$y-5=\frac{1}{3}x-\frac{5}{3}$

$\boxed{y=\frac{1}{3}x+\frac{10}{3}}$

$(5,5)(3,-1)$

$y-5=\left(\frac{5-(-1)}{5-3}\right)(x-5)$

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

$y-5=3x-15$

$\boxed{y=3x-10}$

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Rabee Nunes - 17

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3 - C_5

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Points $(-1,-4)$, $(3,-2)$, $(5,2)$

circumscribided by a circle

$(-1,-4)$ $(5,2)$

midp. $= (2,-1)$

eq. $\perp$ line is $y = -x+1$

$(-1,-4)$ $(3,-2)$

midpoint $= (1,-3)$

eq $\perp$ line is $y = 2x-1$

$$2x-1 = -x+1$$
$$2x = -x+2$$
$$-x = 2$$
$$x = -2$$

$2(-2)-1 = y$ $\quad y = -(-2)+1$

$-4-1 = 4$ $\quad y = 3$

C of C $= (2,3)$

$r = \sqrt{(-1+2)^2 + (4-3)^2}$

$r^2 = \sqrt{50} = 5\sqrt{2}$

$$\boxed{50 = (-1+2)^2 + (-4-3)^2}$$

x

y

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Revised 9

Date: Aug. 8, 2008

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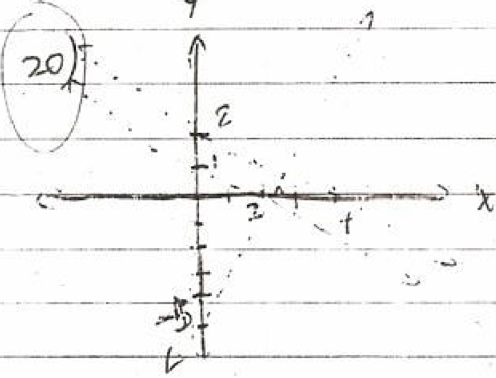
III-Cesium

20)



There are 2 possible circles.

To get the radius find half the distance between the 2 parallel lines $x+2y=4$ and $x+2y=2$. Since $y=2x-5$ is perpendicular to both, we can find the points of intersection between $y=2x-5$ and $x+2y=4$, and $y=2x-5$ and $x+2y=2$.

$L_1 \cap L_3$

$x+2y=4 \cap y=2x-5$

$$\begin{cases} y=2x-5 \\ y=\frac{-x}{2}+2 \end{cases}$$

$2x-5=-\frac{1}{2}x+2$

$\frac{5}{2}x=7$

$x=\frac{14}{5}$ $\quad y=\frac{3}{5}$

$P\left(\frac{14}{5},\frac{3}{5}\right)$

$L_2 \cap L_3$

$x+2y=2 \cap y=2x-5$

$$\begin{cases} y=2x-5 \\ y=\frac{-x}{2}+1 \end{cases}$$

$2x-5=\frac{-x}{2}+1$

$\frac{5}{2}x=6$

$x=\frac{12}{5}$ $\quad y=\frac{-1}{5}$

$Q\left(\frac{12}{5},\frac{-1}{5}\right)$

The diameter of the circle is the distance between P and Q

$$\sqrt{\left(\frac{14}{5}-\frac{12}{5}\right)^2+\left(\frac{3}{5}-\frac{-1}{5}\right)^2} = \frac{2\sqrt{5}}{5}$$

The radius is $\frac{\sqrt{5}}{5}$

The line $\perp$ to $y=2x-5$ and passing through the midpoint of P and Q also passes through the center of the circle.
midpoint of P and Q is R
$R\left(\frac{13}{5}, \frac{1}{5}\right)$

$\perp$ to $y=2x-5 \Rightarrow y = \frac{-x}{2} + \frac{3}{2}$

The circle with center R and radius $\frac{\sqrt{5}}{5}$ also passes through the center of the circles that are tangent to L_1, L_2, and L_3.

$$\begin{cases}\left(x-\frac{13}{5}\right)^2+\left(y-\frac{1}{5}\right)^2=\frac{1}{5}\\ y=-\frac{1}{2}x+\frac{3}{2}\end{cases}$$

$$\left(x-\frac{13}{5}\right)^2+\left(-\frac{1}{2}x+\frac{13}{10}\right)^2=\frac{1}{5}$$

$$x^2-\frac{26x}{5}+\frac{169}{25}+\frac{1}{4}x^2-\frac{13x}{10}+\frac{169}{100}=\frac{1}{5}$$

$$\frac{5}{4}x^2-\frac{13}{2}x+\frac{33}{4}=0$$

$$5x^2-26x+33=0$$

$$(5x-11)(x-3)=0$$

$x=3$ or $x=\frac{11}{5}$

$y=0$ or $y=\frac{2}{5}$

The equation of circles tangent to L_1, L_2 and L_3 are $(x-3)^2+y^2=\frac{1}{5}$ and $\left(x-\frac{11}{5}\right)^2+\left(y-\frac{2}{5}\right)^2=\frac{1}{5}$.