HW p433 10,11,13,14

HW: p.433 #1,3,9–14

14. Are the lines $2x - 3y + 15 = 0$ and $(x, y) = (1, 6) + t(6, 4)$ parallel? Explain.

$3y = 2x + 15$

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

$m = \frac{2}{3} = \frac{b}{a}$

$(a,b) = (6,4)$

slope $= \frac{b}{a} = \frac{4}{6} = \frac{2}{3}$

same

13. The line $L$ has $x = 2 + t$, $y = 9 + t$, $t \in \mathbf{R}$, as its parametric equations. If $L$ intersects the circle with equation $x^2 + y^2 = 169$ at points $A$ and $B$, determine the following:

a. the coordinates of points $A$ and $B$

b. the length of the chord $AB$

(a) $(2+t)^2 + (9+t)^2 = 169$

$4 + 4t + t^2 + 81 + 18t + t^2 = 169$

$2t^2 + 22t - 84 = 0$

$2(t^2 + 11t - 42) = 0$

$-3$

$14$

$2(t-3)(t+14) = 0$ $t = 3$ or $t = -14$

pt. A at $t=3$ and pt. B at $t = -14$

$x = 2+3 = 5$

$y = 9+3 = 12$

$A(5,12)$

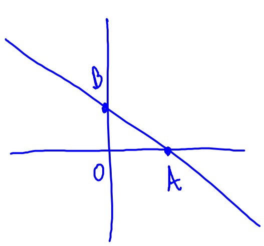
$x = 2-14 = -12$

$y = 9-14 = -5$

$B(-12,-5)$

(b) $d = \sqrt{(\quad)^2 + (\quad)^2}$

11. The parametric equations of a line are given as $x = -10 - 2s$, $y = 8 + s$, $s \in \mathbf{R}$. This line crosses the $x$-axis at the point with coordinates $A(a, 0)$ and crosses the $y$-axis at the point with coordinates $B(0, b)$. If $O$ represents the origin, determine the area of the triangle $AOB$.




point $(-10,8)$

$(a,b) = (-2,1)$

slope $-\frac{1}{2}$

$\begin{cases} a = -10 - 2s \\ 0 = 8 + s \end{cases}$

$s = -8$

$a = -10 + 16 = 6$

$A(6,0)$

$0 = -10 - 2s$

$2s = -10$

$s = -5$

$b = 8 + s$

$b = 8 - 5 = 3$

$B(0,3)$

Area $= \frac{1}{2}bh$

$= \frac{1}{2}(6)(3) = 9\ m^2$

10. For the line $L: \vec{r} = (1, -5) + s(3, 5), s \in \mathbf{R}$, determine the following:

a. an equation for the line perpendicular to $L$, passing through $P(2, 0)$

b. the point at which the line in part a. intersects the $y$-axis

ⓐ $m = \frac{5}{3}$ $\quad m_{\perp} = \frac{-3}{5}$

$\therefore (a, b) = (-3, 5)$

$\vec{q} = (2, 0) + t(-3, 5) \quad t \in \mathbf{R}$

$x = 2 - 3t$

$y = 0 + 5t$

sub $x = 0$

$3t = 2 \quad t = 2/3$

$y = 5\left(\frac{2}{3}\right) = \frac{10}{3}$

$\therefore$ y int $\left(0, \frac{10}{3}\right)$