Pre-Calculus: Trigonometry

Chapter 7 Pre-Test

1. (5 pts each, 10 pts total) Find the component form of the resultant vector.

a) u = (2, −6)
v = (−3, 9)

Find: −u − v

$-u : (-2, +6)$

$-v : (3, -9)$

$+$

$(1, -3)$

b) u = (-6, −3)
b = (−4, 8)

Find: u + b

2. (5 pts each, 10 pts total) Find the magnitude and direction angle of the resultant vector.

a) u = (6, 3)
g = (4, −9)

Find: u + g

$(6, 3)$

$(4, -9)$

$(10, -6)$

$r = \sqrt{x^2 + y^2}$

$r = \sqrt{(10)^2 + (-6)^2} = \sqrt{100 + 36}$

$\sqrt{136}$

$\sqrt{4}\sqrt{34}$

$2\sqrt{34}$

$\theta = \tan^{-1}\frac{y}{x}$

$\theta = \tan^{-1}\left(\frac{-6}{10}\right)$

IV

$-31°$

$+360$

329

b) a = (1, 12)
b = (-3, 4)

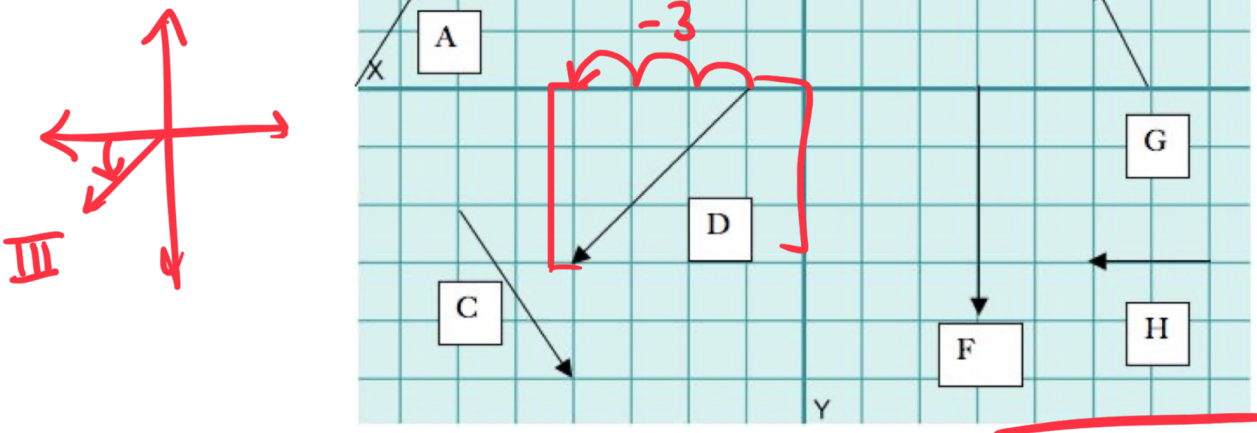
Find: a − b

$2\sqrt{34}, -31°$

or $2\sqrt{34}, 329°$

3. (10 pts each, 20 pts total) Given the following vectors, create head to tail models on paper and find the resultant magnitude and direction. The arrows are not perfect but use the corner that they are closest to.

Please round the magnitude and direction to the nearest tenth (when applicable). All direction values should be positive. Please input your answer in the form (r, θ).



a) D + C

(r, θ)

D: <-3, -3>

C: < 2, -3>

D+C <-1, -6>

$r = \sqrt{(-1)^2 + (-6)^2}$

$\sqrt{1+36} = \sqrt{37}$

$\theta = \tan^{-1}\left(\frac{-6}{-1}\right) = 81$

$+180$

261

$\sqrt{37}, 261°$

b) G + H

(r, θ)

4. (7.5 pts each, 15 pts total) Find the dot product of the given vectors.

a) u = (7, 3)
v = (−5, −3)

$u \cdot v$

$(u_x * v_x) + (u_y * v_y)$

$(7 * (-5)) + (3 * -3)$

$-35 + -9$

$\boxed{-44}$

b) a = (8, 2)
b = (-3, -6)

$\theta_u = \tan^{-1}\left(\frac{-10}{-8}\right) = 51.34 + 180 = 231.34$

$\theta_v = \tan^{-1}\left(\frac{-4}{6}\right) = \begin{matrix} +360 \\ -33.7 \\ \hline 326.3 \end{matrix}$ $\begin{matrix} 326.3 \\ -231.34 \\ \hline 95 \end{matrix}$

5. (15 pts total) Find the measure of the angle between the two vectors.

u = (−8, −10)
v = (6, -4)

dot

$\theta = \cos^{-1}\left(\frac{u \cdot v}{|u||v|}\right)$ $\boxed{95°}$

$u \cdot v$

$(u_x \cdot v_x) + (u_y \cdot v_y)$

$(-8 \cdot 6) \quad (-10 \cdot (-4))$

$-48 + 40$

-8

"r"

$|u| = \sqrt{x^2 + y^2}$

"r"

"r"

$|u| = \sqrt{(-8)^2 + (-10)^2}$

$\sqrt{64 + 100}$

$\sqrt{164}$ $\sqrt{4}\sqrt{41} = 2\sqrt{41}$

$|v| = \sqrt{6^2 + (-4)^2}$

$\sqrt{36 + 16}$ $\sqrt{52} = 2\sqrt{13}$

$\cos^{-1}\left(\frac{-8}{(2\sqrt{41})(2\sqrt{13})}\right)$

Use Unit Circle

6. (7.5 pts each, 15 pts total) Convert each pair of polar coordinates to rectangular coordinates. Please do not use decimals.

a) (6, 60°)

$x = r\cos\theta$ $\quad y = r\sin\theta$

$6\cos 60°$ $\quad 6\sin 60°$

$6\left(\frac{1}{2}\right)$ $\quad 3\not{6}\left(\frac{\sqrt{3}}{\not{2}}\right)$

$(3, 3\sqrt{3})$

b) (3, 315°)

7. (7.5 pts each, 15 pts total) Convert each pair of rectangular coordinates to polar coordinates where $r > 0$ and $0 \le \theta < 360°$.

polar (r, θ)

a) $(4, 8\sqrt{3})$

$r = \sqrt{x^2 + y^2}$

$\sqrt{(4)^2 + (8\sqrt{3})^2}$

$(8\sqrt{3})^2 = 8\sqrt{3} \cdot 8\sqrt{3}$

$64 \cdot 3$

192

$\sqrt{16 + 192} = \sqrt{208}$

$\sqrt{16}\sqrt{13}$

$r = 4\sqrt{13}$

Quad I

b) $(\sqrt{3}, -2)$

$4\sqrt{13}, 74°$

$\theta = \tan^{-1}\frac{y}{x} = \tan^{-1}\left(\frac{8\sqrt{3}}{4}\right) = 74°$