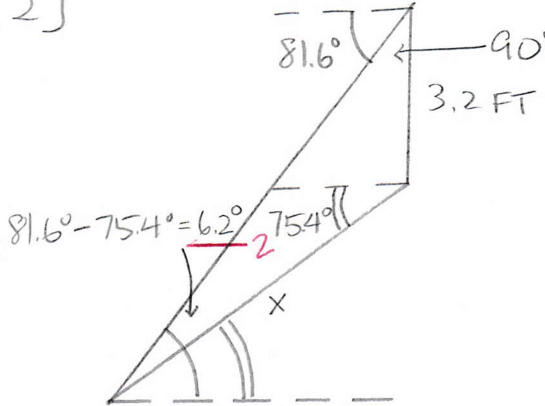
[2]



$90° - 81.6° = \underline{8.4°}$ 2

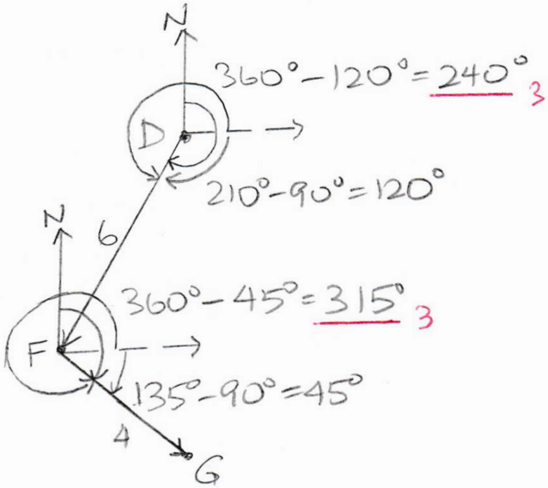
$$\frac{x}{\sin 8.4°} = \frac{3.2\text{ FT}}{\sin 6.2°}$$

3

$$x = \frac{(3.2\text{ FT})\sin 8.4°}{\sin 6.2°} \approx 4.3\text{ FT}$$

2

[3]



[a] [i] $\overrightarrow{DF} = 6\langle \cos 240°, \sin 240° \rangle$

$= 6\left\langle -\frac{1}{2}, -\frac{\sqrt{3}}{2} \right\rangle$

$= \langle -3, -3\sqrt{3} \rangle$

[ii] $\overrightarrow{FG} = 4\langle \cos 315°, \sin 315° \rangle$

$= 4\left\langle \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right\rangle$

$= \langle 2\sqrt{2}, -2\sqrt{2} \rangle$

[b] $\overrightarrow{DG} = \overrightarrow{DF} + \overrightarrow{FG} = \langle -3 + 2\sqrt{2}, -3\sqrt{3} - 2\sqrt{2} \rangle$

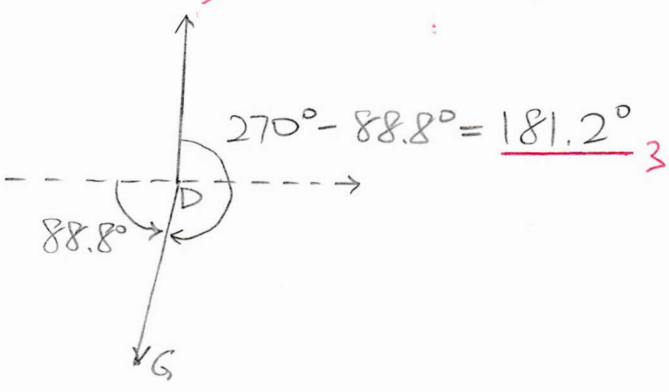
[c] $\|\overrightarrow{DG}\| = \sqrt{(-3+2\sqrt{2})^2 + (-3\sqrt{3}-2\sqrt{2})^2} \approx 8.0$ MI

$\cos\theta = \dfrac{-3+2\sqrt{2}}{8.0}$ $\qquad$ $\sin\theta = \dfrac{-3\sqrt{3}-2\sqrt{2}}{8.0}$

≈ -0.0214 $\qquad$ ≈ -0.9998

$\cos\theta$, $\sin\theta$ BOTH NEGATIVE $\rightarrow$ θ IN Q_3

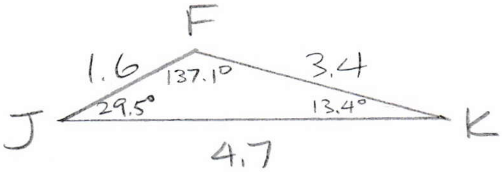
$\theta_{REF} = \tan^{-1}\left|\dfrac{-3\sqrt{3}-2\sqrt{2}}{-3+2\sqrt{2}}\right| \approx 88.8°$



GJ'S HOUSE IS 8.0 MI ON A BEARING OF 181.2° FROM DJ'S HOUSE

[4] [a] N IS OBTUSE BUT $n \le c \longrightarrow$ DNE 3

[b]



$$4.7^2 = 1.6^2 + 3.4^2 - 2(1.6)(3.4)\cos\theta$$

$$\cos\theta = \frac{1.6^2 + 3.4^2 - 4.7^2}{2(1.6)(3.4)}$$

$$\theta = \cos^{-1}\frac{1.6^2 + 3.4^2 - 4.7^2}{2(1.6)(3.4)} \approx 137.1° \quad 4 \quad 2$$

$$\frac{\sin K}{1.6} = \frac{\sin 137.1°}{4.7} \longrightarrow K = \sin^{-1}\frac{1.6 \sin 137.1°}{4.7} \approx 13.4° \quad 3 \quad 2$$

$$J = 180° - (137.1° + 13.4°) = \underline{29.5°} \quad 2$$

[5] [a] $\overrightarrow{AB} = (-2-3)\vec{\imath} + (-1-5)\vec{\jmath} = -5\vec{\imath} - 6\vec{\jmath}$ 3

[b] $\vec{u} = \langle -2-1, -1-{}^{-}3 \rangle = \langle -3, 2 \rangle$ 3

$$\frac{\overrightarrow{AB}\cdot\vec{u}}{\vec{u}\cdot\vec{u}}\vec{u} = \frac{\langle -5,-6\rangle \cdot \langle -3,2\rangle}{\langle -3,2\rangle \cdot \langle -3,2\rangle}\langle -3,2\rangle = \frac{15-12}{9+4}\langle -3,2\rangle$$ 3 3

$$= \frac{3}{13}\langle -3,2\rangle = \left\langle -\frac{9}{13}, \frac{6}{13}\right\rangle$$ 3

[c] $$\cos^{-1}\frac{\overrightarrow{AB}\cdot\vec{u}}{\|\overrightarrow{AB}\|\|\vec{u}\|} = \cos^{-1}\frac{3}{\sqrt{(-5)^2+(-6)^2}\sqrt{13}} = \cos^{-1}\boxed{\frac{3}{\sqrt{61}\sqrt{13}}} \approx 83.9^\circ$$ 3 4 2

[d] $$\overrightarrow{AB} - \text{PROJ}_{\vec{u}}\overrightarrow{AB} = \langle -5,-6\rangle - \left\langle -\frac{9}{13}, \frac{6}{13}\right\rangle = \left\langle -4\frac{4}{13}, -6\frac{6}{13}\right\rangle$$ 3

$$= \left\langle -\frac{56}{13}, -\frac{84}{13}\right\rangle$$

$$\overrightarrow{AB} = \left\langle -\frac{9}{13}, \frac{6}{13}\right\rangle + \left\langle -\frac{56}{13}, -\frac{84}{13}\right\rangle$$ 2

[e] $$\langle -5,-6\rangle \cdot \langle k-1, k+3\rangle = -5k+5-6k-18 = -11k-13 = 0$$ 3 3 2

$$k = -\frac{13}{11}$$ 1

[f] $$14\overrightarrow{AB} - \cancel{7\vec{u}} - \cancel{8\vec{u}} - 2\overrightarrow{BA} - 25\overrightarrow{AB} + \cancel{15\vec{u}} = 14\overrightarrow{AB} + 2\overrightarrow{AB} - 25\overrightarrow{AB}$$

$$= -9\overrightarrow{AB} = -9\langle -5,-6\rangle = \langle 45, 54\rangle$$ 2 2