

WIR 1 Appendix D, Section 1.1

1 Appendix D

1. If $\tan \alpha = \frac{3}{4}$ and $0 \leq \alpha \leq \frac{\pi}{2}$,
find $\cos \alpha$, and $\sin \alpha$.
2. If $\cos \theta = -\frac{1}{3}$ and $\pi \leq \theta \leq \frac{3\pi}{2}$.

$$\sin \theta =$$

$$\tan \theta =$$

$$\sec \theta =$$

$$\csc \theta =$$

$$\cot \theta =$$

3. (a) Prove that

$$\frac{\sin(a - b)}{\cos a \cos b} = \tan a - \tan b. \tag{1}$$

- (b) For which values of a and b do the equation (1) exist?

4. Solve the following equations on the interval $[0, 2\pi]$

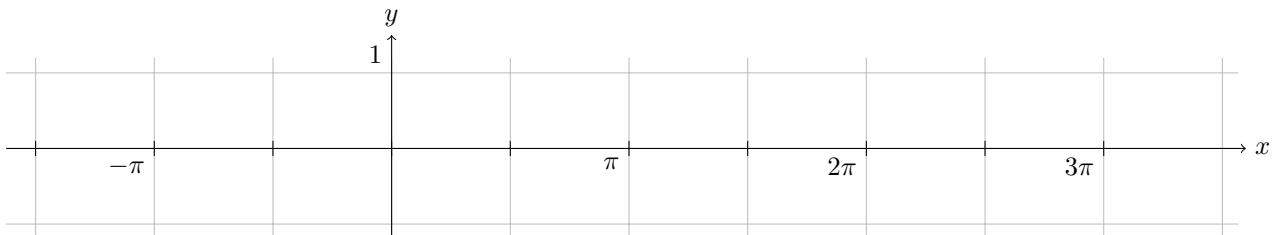
- (a) $0 \leq \tan x \leq 1$.

- (b) $2 \sin^2 x - 1 = 0$.

- (c) $\sin x \cos(2x) + \sin(2x) \cos x = \frac{1}{2}$.

5. Sketch the graph the function

$$y = |\cos x|.$$

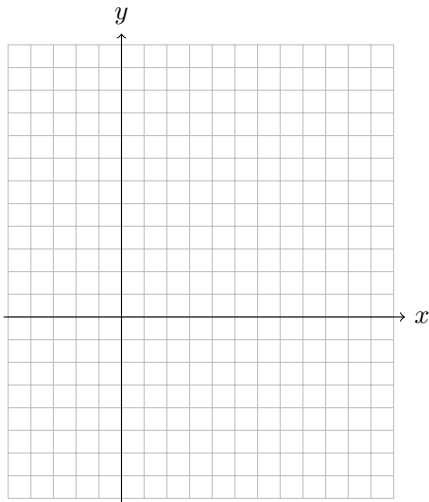


2 Section 1.1

1. Let $\vec{u} = 4\mathbf{i} - 3\mathbf{j}$ and $\vec{v} = \langle 3, 2 \rangle$.

(a) Sketch the position vectors of \vec{u} and \vec{v} .

(b) Represent geometrically the vectors $\vec{w} = \vec{u} + 2\vec{v}$ and the vector $\vec{s} = 3\vec{v} - 2\vec{u}$.

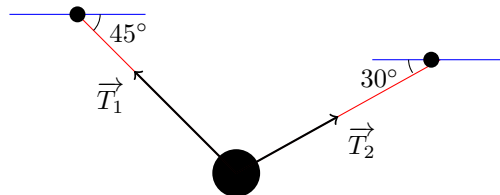


(c) Calculate the magnitude of $\vec{u} - \vec{v}$.

(d) Find a unit vector that has the same direction as \vec{u} .

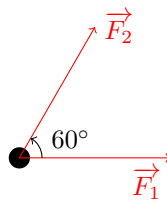
(e) Given $\vec{t} = \langle 5, -8 \rangle$, find 2 real numbers a and b such that $\vec{t} = a\vec{u} + b\vec{v}$.

2. A 50lb weight is hanging from two 10ft long ropes as shown below:



Find the components of the tension forces and their magnitudes.

3. 2 forces of 10lb each are pulling a weight as shown in the picture



Find the components of the resultant force \vec{F} acting on the weight, its magnitude and the angle between \vec{F}_1 and \vec{F} .

4. A pirate walks in the west direction on a ship at a speed of 2 mi/h. His ship is moving north at a speed of 10mi/h. Find the speed and the direction of the pirate relative to the surface of the water.

5. A swimmer heads directly across a 100m wide river and swims at a constant speed of 20 m/min. He reaches the other side of the river 30m downstream. What is the speed of the current?