Section 1: Trigonometric functions and identities

Solutions to Exercise level 2

1. (i) $\sin 120° = \sin 60° = \frac{\sqrt{3}}{2}$

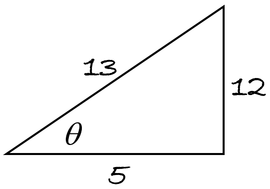
   (ii) $\cos(-120°) = \cos 120° = -\cos 60° = -\frac{1}{2}$

   (iii) $\tan 135° = -\tan 45° = -1$

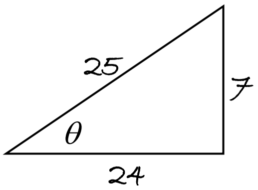
   (iv) $\sin 300° = -\sin 60° = -\frac{\sqrt{3}}{2}$

   (v) $\cos 270° = -\cos 90° = 0$

2. (i) $\cos\theta = \frac{5}{13}$

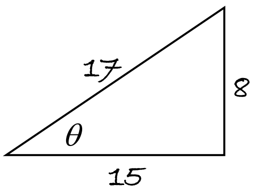


   (ii) Since θ is in the second quadrant, cos θ and tan θ are both negative.



   $\cos\theta = -\frac{24}{25}$
   $\tan\theta = -\frac{7}{24}$

   (iii) Since θ is in the second quadrant, sin θ is positive and cos θ is negative.



   $\sin\theta = \frac{8}{17}$
   $\cos\theta = -\frac{15}{17}$

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3. (i) $$\frac{\sqrt{1-\cos^2 x}}{\tan x} = \frac{\sqrt{\sin^2 x}}{\tan x}$$
$$= \sin x \times \frac{\cos x}{\sin x}$$
$$= \cos x$$

(ii) $$\frac{\sin x}{\sqrt{1-\sin^2 x}} = \frac{\sin x}{\sqrt{\cos x}}$$
$$= \frac{\sin x}{\cos x}$$
$$= \tan x$$

(iii) $$\frac{\cos^2 x}{1+\sin x} = \frac{1-\sin^2 x}{1+\sin x}$$
$$= \frac{(1+\sin x)(1-\sin x)}{1+\sin x}$$
$$= 1-\sin x$$

4. (i) $$\sin 120° - \sin 150° = +\tfrac{\sqrt{3}}{2} - \tfrac{1}{2}$$
$$= \tfrac{1}{2}\left(\sqrt{3}-1\right)$$

(ii) $$\tan 225° + \cos(-30°) = 1 + \tfrac{\sqrt{3}}{2}$$
$$= \tfrac{1}{2}\left(2+\sqrt{3}\right)$$

(iii) $$\frac{\cos 45°}{\sin 135°} = \frac{\left(\frac{1}{\sqrt{2}}\right)}{\left(\frac{1}{\sqrt{2}}\right)}$$
$$= 1$$

(iv) $$2\tan 60^\circ - 2\tan(-60^\circ) = 2\sqrt{3} - 2\left(-\sqrt{3}\right)$$
$$= 4\sqrt{3}$$

(v) $$\frac{\sin 50°}{\sqrt{1-\cos^2 50°}} = \frac{\sin 50°}{\sin 50°}$$
$$= 1$$