

Exercise 2 - Reductions

$$\begin{aligned} 1.1) \sin(180^\circ + \theta) & \text{ III} \\ &= -\sin\theta \end{aligned}$$

$$\begin{aligned} 1.2) \tan(360^\circ - \theta) & \text{ IV} \\ &= -\tan\theta \end{aligned}$$

$$\begin{aligned} 1.3) \tan(180^\circ + \theta) & \text{ III} \\ &= \tan\theta \end{aligned}$$

$$\begin{aligned} 1.4) \cos(360^\circ - \theta) & \text{ IV} \\ &= \cos\theta \end{aligned}$$

$$\begin{aligned} 1.5) \tan(360^\circ + \theta) & \text{ I} \\ &= \tan\theta \end{aligned}$$

$$\begin{aligned} 1.6) \cos(180^\circ - \theta) & \text{ II} \\ &= -\cos\theta \end{aligned}$$

$$\begin{aligned} 1.7) \sin(360^\circ + \theta) & \text{ I} \\ &= \sin\theta \end{aligned}$$

$$\begin{aligned} 1.8) \cos(360^\circ + \theta) & \text{ I} \\ &= \cos\theta \end{aligned}$$

$$\begin{aligned} 2.1) \sin 122^\circ & \text{ II} \\ &= \sin(180^\circ - 58^\circ) \\ &= \sin 58^\circ \end{aligned}$$

$$\begin{aligned} 2.2) \cos 156^\circ & \text{ II} \\ &= \cos(180^\circ - 24^\circ) \\ &= -\cos 24^\circ \end{aligned}$$

$$\begin{aligned} 2.3) \tan 133^\circ & \text{ II} \\ &= \tan(180^\circ - 47^\circ) \\ &= -\tan 47^\circ \end{aligned}$$

$$\begin{aligned} 2.4) \sin 166^\circ & \text{ II} \\ &= \sin(180^\circ - 14^\circ) \\ &= \sin 14^\circ \end{aligned}$$

$$\begin{aligned} 2.5) \tan 145^\circ & \text{ II} \\ &= \tan(180^\circ - 35^\circ) \\ &= -\tan 35^\circ \end{aligned}$$

$$\begin{aligned} 2.6) \cos 99^\circ & \text{ II} \\ &= \cos(180^\circ - 81^\circ) \\ &= -\cos 81^\circ \end{aligned}$$

$$\begin{aligned} 2.7) \sin 245^\circ & \text{ III} \\ &= \sin(180^\circ + 65^\circ) \\ &= -\sin 65^\circ \end{aligned}$$

$$\begin{aligned} 2.8) \cos 225^\circ & \text{ III} \\ &= \cos(180^\circ + 45^\circ) \\ &= -\cos 45^\circ \end{aligned}$$

$$\begin{aligned} 2.9) \tan 191^\circ & \text{ III} \\ &= \tan(180^\circ + 11^\circ) \\ &= \tan 11^\circ \end{aligned}$$

$$\begin{aligned} 2.10) \tan 209^\circ & \text{ III} \\ &= \tan(180^\circ + 29^\circ) \\ &= \tan 29^\circ \end{aligned}$$

$$\begin{aligned}
 2.11) \cos 230^\circ & \text{ III} \\
 &= \cos(180^\circ + 50^\circ) \\
 &= -\cos 50^\circ
 \end{aligned}$$

$$\begin{aligned}
 2.12) \sin 216^\circ & \text{ III} \\
 &= \sin(180^\circ + 36^\circ) \\
 &= -\sin 36^\circ
 \end{aligned}$$

$$\begin{aligned}
 2.13) \cos 350^\circ & \text{ IV} \\
 &= \cos(360^\circ - 10^\circ) \\
 &= \cos 10^\circ
 \end{aligned}$$

$$\begin{aligned}
 2.14) \cos 300^\circ & \text{ IV} \\
 &= \cos(360^\circ - 60^\circ) \\
 &= \cos 60^\circ
 \end{aligned}$$

$$\begin{aligned}
 2.15) \tan 288^\circ & \text{ IV} \\
 &= \tan(360^\circ - 72^\circ) \\
 &= -\tan 72^\circ
 \end{aligned}$$

$$\begin{aligned}
 2.16) \sin 302^\circ & \text{ IV} \\
 &= \sin(360^\circ - 58^\circ) \\
 &= -\sin 58^\circ
 \end{aligned}$$

$$\begin{aligned}
 2.17) \sin 295^\circ & \text{ IV} \\
 &= \sin(360^\circ - 65^\circ) \\
 &= -\sin 65^\circ
 \end{aligned}$$

$$\begin{aligned}
 2.18) \tan 322^\circ & \text{ IV} \\
 &= \tan(360^\circ - 38^\circ) \\
 &= -\tan 38^\circ
 \end{aligned}$$

$$3.1) \frac{\overset{\text{III}}{\cos(180^\circ + x)} \cdot \overset{\text{II}}{\tan(180^\circ - x)} \cdot \overset{\text{III}}{\sin(180^\circ + x)}}{\underset{\text{II}}{\sin(180^\circ - x)} \cdot \sin x}$$

$$= \frac{(-\cos x)(-\tan x)(-\sin x)}{\sin x \cdot \sin x}$$

$$\textcircled{*} = \frac{\cos x \cdot \tan x}{\sin x}$$

$$3.2) \frac{\overset{\text{II}}{2 \sin(180^\circ - x)} \cdot \overset{\text{IV}}{\cos(360^\circ - x)}}{\underset{\text{III}}{\sin(180^\circ + x)} \cdot \underset{\text{II}}{\cos(180^\circ - x)}}$$

$$= \frac{2 \sin x \cdot \cos x}{(-\sin x)(-\cos x)}$$

$$= 2$$

Identities

$$4) \frac{\cos 150^\circ \cdot \sin 330^\circ}{\tan 225^\circ \cdot \sin 300^\circ}$$

$$= \frac{\cos(180^\circ - 30^\circ) \cdot \sin(360^\circ - 30^\circ)}{\tan(180^\circ + 45^\circ) \cdot \sin(360^\circ - 60^\circ)}$$

$$= \frac{(-\cos 30^\circ) \cdot (-\sin 30^\circ)}{\tan 45^\circ \cdot (-\sin 60^\circ)}$$

$$= \frac{\cos 30^\circ \cdot \sin 30^\circ}{1 \cdot (-\sin 60^\circ)}$$

$$= \frac{\frac{\sqrt{3}}{2} \cdot \frac{1}{2}}{1 \cdot \left(-\frac{\sqrt{3}}{2}\right)}$$

$$= \frac{\frac{\sqrt{3}}{4}}{-\frac{\sqrt{3}}{2}}$$

$$= \frac{\sqrt{3}}{4} \times \frac{2}{-\sqrt{3}}$$

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

$$4.2) \frac{\sin 390^\circ \cdot \cos 225^\circ \cdot \sin 210^\circ \cdot \sin 315^\circ \cdot \sin 270^\circ}{\cos 360^\circ}$$

$$= \frac{\sin 30^\circ \cdot \cos(180^\circ + 45^\circ) \cdot \sin(180^\circ + 30^\circ) \cdot \sin(360^\circ - 45^\circ) \cdot \left(\frac{-2}{2}\right)}{\left(\frac{2}{2}\right)}$$

$$= \frac{\left(\frac{1}{2}\right) \cdot (-\cos 45^\circ) \cdot (-\sin 30^\circ) \cdot (-\sin 45^\circ) \cdot \left(\frac{-2}{2}\right)}{\left(\frac{2}{2}\right)}$$

$$= \frac{\left(\frac{1}{2}\right) \cdot \left(\frac{-\sqrt{2}}{2}\right) \cdot \left(-\frac{1}{2}\right) \cdot \left(\frac{-\sqrt{2}}{2}\right) \cdot (-1)}{1}$$

$$= \frac{2}{16}$$

$$= \frac{1}{8}$$