

p. 451 #1, 3, 9, 11, 13, 15, 24, 26, 27, 29, 31

1)  $\sin\theta = ?$   $\cos\theta = ?$   $\tan\theta = \frac{3}{4}$   $\sin\theta > 0$

$$\frac{s^2 + c^2}{c^2} = 1 \quad \tan^2 x + 1 = \sec^2 x$$

$\cos\theta > 0$

$$\left(\frac{3}{4}\right)^2 + 1 = \sec^2\theta \Rightarrow \frac{9}{16} + 1 = \sec^2\theta \Rightarrow \frac{25}{16} = \sec^2\theta \Rightarrow \cos^2\theta = \frac{16}{25}$$

$$\boxed{\cos\theta = \frac{4}{5}}$$

$$\cos^2\theta + \sin^2\theta = 1$$

$$\left(\frac{4}{5}\right)^2 + \sin^2\theta = 1 \Rightarrow \frac{16}{25} + \sin^2\theta = 1 \Rightarrow \sin^2\theta = \frac{9}{25} \Rightarrow \boxed{\sin\theta = \frac{3}{5}}$$

3.  $\tan\theta = ?$   $\cot\theta = ?$   $\sec\theta = 4$   $\sin\theta < 0$

$\tan\theta \cdot \cot\theta < 0$

$$\tan^2\theta + 1 = \sec^2\theta$$

$$\tan^2\theta + 1 = 4^2 \Rightarrow \tan^2\theta = 15 \Rightarrow \tan\theta = \pm\sqrt{15} \Rightarrow \boxed{\tan\theta = -\sqrt{15}}$$

$$\cot\theta = \frac{1}{\tan\theta} = \frac{-1}{\sqrt{15}} = \boxed{\frac{-\sqrt{15}}{15} = \cot\theta}$$

9.  $\tan x \cos x \Rightarrow \frac{\sin x}{\cos x} \cdot \cos x = \sin x$

11. ~~sec~~ omit this for now. ~~12~~ I meant 12.

13.  $\frac{1 + \tan^2 x}{\csc^2 x} \Rightarrow \frac{\sec^2 x}{\csc^2 x} \Rightarrow \frac{1/\cos^2 x}{1/\sin^2 x} \Rightarrow \frac{1}{\cos^2 x} \cdot \frac{\sin^2 x}{1} = \frac{\sin^2 x}{\cos^2 x}$

$$= \boxed{\tan^2 x}$$

$$15. \cos x - \cos^3 x = \cos x (1 - \cos^2 x) = \boxed{\cos x \cdot \sin^2 x}$$

$$24. \frac{1 + \tan x}{1 + \cot x} = \frac{1 + \frac{\sin x}{\cos x}}{1 + \frac{\cos x}{\sin x}} \Rightarrow \frac{\frac{\cos x + \sin x}{\cos x}}{\frac{\sin x + \cos x}{\sin x}} = \frac{\cos x + \sin x}{\cos x} \cdot \frac{\sin x}{\cos x + \sin x}$$

$$\Rightarrow \frac{\sin x}{\cos x} = \boxed{\tan x}$$

$$26. \frac{\sec^2 u - \tan^2 u}{\cos^2 v + \sin^2 v} = \frac{1}{1} = \boxed{1}$$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$\boxed{1 = \sec^2 \theta - \tan^2 \theta}$$

$$27. \sin x (\tan x + \cot x) = \sin x \left( \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} \right) = \sin x \left( \frac{\sin^2 x + \cos^2 x}{\sin x \cos x} \right)$$

$$= \frac{\sin x}{\cancel{\sin x} \cos x} = \frac{1}{\cos x} = \boxed{\sec x}$$

$$29. \sin x \cos x \tan x \sec x \csc x$$

$$\cancel{\sin x} \cancel{\cos x} \cdot \frac{\sin x}{\cancel{\cos x}} \cdot \frac{1}{\cancel{\cos x}} \cdot \frac{1}{\cancel{\sin x}} = \frac{\sin x}{\cos x} = \boxed{\tan x}$$

$$31. \frac{\tan x}{\csc^2 x} + \frac{\tan x}{\sec^2 x} = \frac{\cancel{\sin x}}{\cancel{\cos x}} \cdot \frac{1}{\cancel{\sin^2 x}} + \frac{\cancel{\sin x}}{\cancel{\cos x}} \cdot \frac{1}{\cancel{\cos^2 x}} = \frac{\cancel{\sin x}}{\cancel{\cos x}} \left( \frac{1}{\cancel{\sin x}} + \frac{1}{\cancel{\cos x}} \right)$$

$$= \frac{\cancel{\sin x}}{\cancel{\cos x}} \left( \frac{\cancel{\cos^2 x} + \cancel{\sin^2 x}}{\cancel{\sin x \cos^2 x}} \right) = \frac{\cancel{\sin x}}{\cancel{\cos^3 x} + \cancel{\sin^3 x}} = \frac{1}{\cancel{\sin x} \cancel{\cos^2 x}}$$

$$\frac{\tan x}{\csc^2 x} + \frac{\tan x}{\sec^2 x} = \tan x \left( \frac{1}{\csc^2 x} + \frac{1}{\sec^2 x} \right) = \tan x \left( \frac{\sin^2 x + \cos^2 x}{1} \right) = \boxed{\tan x}$$