

Unit 6: Lesson 1 p. 381 #19-44

19) $\csc x \sin x$
 $\left(\frac{1}{\sin x}\right)\left(\frac{\sin x}{1}\right)$
 $\boxed{1}$

20) $\tan x \cos x$
 $\left(\frac{\sin x}{\cos x}\right)\left(\frac{\cos x}{1}\right)$
 $\boxed{\sin x}$

21) $\tan^2 x - \sec^2 x$
 $\sec^2 x - 1 - \sec^2 x$
 $\boxed{-1}$

22) $(1 - \sin^2 x)(\sec x)$
 $(\cos^2 x)(\sec x)$
 $\left(\frac{\cos^2 x}{1}\right)\left(\frac{1}{\cos x}\right)$
 $\boxed{\cos x}$

23) $\frac{\sin(-x)^{\text{odd}}}{\cos(-x)^{\text{even}}}$
 $\frac{-\sin x}{\cos x}$
 $\boxed{-\tan x}$

24) $\frac{\sin\left(\frac{\pi}{2} - x\right)^{\text{cofunctions!}}}{\cos\left(\frac{\pi}{2} - x\right)}$
 $\frac{\cos x}{\sin x}$
 $\boxed{\cot x}$

25) $\cos x \csc x$
 $\left(\frac{\cos x}{1}\right)\left(\frac{1}{\sin x}\right)$
 $\frac{\cos x}{\sin x}$
 $\boxed{\cot x}$

26) $\sin^2 x (\csc^2 x - 1)$
 $\sin^2 x (\cot^2 x)$
 $\left(\frac{\sin^2 x}{1}\right)\left(\frac{\cos^2 x}{\sin^2 x}\right)$
 $\boxed{\cos^2 x}$

27) $\sec^4 x - \tan^4 x$
 $(\sec^2 x + \tan^2 x)(\sec^2 x - \tan^2 x)$
 $(\sec^2 x + \tan^2 x)(1)$
 $\boxed{\sec^2 x + \tan^2 x}$

$$\textcircled{28} \cot x \sec x$$

$$\left(\frac{\cos x}{\sin x}\right) \left(\frac{1}{\cos x}\right)$$

$$\frac{1}{\sin x}$$

$\csc x$

$$\textcircled{29} \frac{\sec^2 x - 1}{\sin^2 x}$$

$$\frac{\tan^2 x}{\sin^2 x}$$

$$\frac{\sin^2 x}{\cos^2 x}$$

$$\frac{\sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$$

$\sec^2 x$

$$\textcircled{30} \frac{\cos^2\left(\frac{\pi}{2} - x\right)}{\cos x}$$

$$\frac{\sin^2 x}{\cos x}$$

$$\frac{\sin x}{1} \left(\frac{\sin x}{\cos x}\right)$$

$\sin x \tan x$

$$\textcircled{31} (\cot x)(\sin x)$$

$$\left(\frac{\cos x}{\sin x}\right) \left(\frac{\sin x}{1}\right)$$

$\cos x$

$$\textcircled{32} \cos \beta \tan \beta$$

$$\left(\frac{\cos \beta}{1}\right) \left(\frac{\sin \beta}{\cos \beta}\right)$$

$\sin \beta$

$$\textcircled{33} \sin x (\csc x - \sin x)$$

$$\frac{\sin x}{1} \cdot \frac{1}{\sin x} - \frac{\sin x \cdot \sin x}{1}$$

$$1 - \sin^2 x$$

$\cos^2 x$

$$\textcircled{34} \sec^2 x (1 - \sin^2 x)$$

$$\sec^2 x (\cos^2 x)$$

$$\frac{1}{\cos^2 x} \cdot \frac{\cos^2 x}{1}$$

1

$$\textcircled{35} \frac{\cot x}{\csc x}$$

$$\frac{\cos x}{\sin x}$$

$$\frac{\cos x}{\sin x} \cdot \frac{\sin x}{1}$$

$\cos x$

$$\textcircled{36} \frac{\sec \theta}{\csc \theta}$$

$$\frac{1}{\sin \theta}$$

$$\frac{1}{\sin \theta} \cdot \frac{\cos \theta}{1} = \frac{\cos \theta}{\sin \theta}$$

$\cot \theta$

$$\textcircled{37} \sec \alpha \cdot \frac{\sin \alpha}{\tan \alpha}$$

$$\frac{1}{\cos \alpha} \cdot \frac{\sin \alpha}{\frac{\sin \alpha}{\cos \alpha}} = \frac{1}{\cos \alpha} \cdot \frac{\sin \alpha}{1} \cdot \frac{\cos \alpha}{\sin \alpha}$$

1

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$$(38) \frac{1}{\tan^2 x + 1} = \frac{1}{\sec^2 x} = \frac{1}{\frac{1}{\cos^2 x}} = 1 \cdot \frac{\cos^2 x}{1} = \boxed{\cos^2 x}$$

$$(39) \frac{\sin(-x)}{\cos x} \stackrel{\text{odd}}{=} \frac{-\sin x}{\cos x} = \boxed{-\tan x}$$

$$(40) \frac{\tan^2 \theta}{\sec^2 \theta} = \frac{\frac{\sin^2 \theta}{\cos^2 \theta}}{\frac{1}{\cos^2 \theta}} = \frac{\sin^2 \theta}{\cos^2 \theta} \cdot \frac{\cos^2 \theta}{1} = \boxed{\sin^2 \theta}$$

$$(41) \sin\left(\frac{\pi}{2} - x\right) \csc x = (\cos x)(\csc x) = \left(\frac{\cos x}{1}\right) \left(\frac{1}{\sin x}\right) \\ = \frac{\cos x}{\sin x} = \boxed{\cot x}$$

$$(42) \cot\left(\frac{\pi}{2} - x\right) \cos x = (\tan x)(\cos x) = \left(\frac{\sin x}{\cos x}\right) \left(\frac{\cos x}{1}\right) \\ = \boxed{\sin x}$$

$$(43) \frac{\cos^2 y}{1 - \sin y} = \frac{1 - \sin^2 y}{1 - \sin y} \stackrel{\text{Diff of 2 squares!}}{=} \frac{(1 - \sin y)(1 + \sin y)}{1 - \sin y} = \boxed{1 + \sin y}$$

$$(44) \csc t (1 + \tan^2 t) = \csc t (\sec^2 t) = \frac{\csc t}{1} \left(\frac{1}{\cot t}\right) = \frac{1}{\cot t} \\ = \boxed{\sec t}$$