Day 4 HW

Friday, January 30, 2015 9:22 AM

- p. 410: 24-33 (omit 28), 35, 37

(24) $\tan x$ (25) 2 (26) 1 (27) $\sec x$ (29) $\tan x$ (30) $\cos y$

(31) $\tan x$ (32) $\sin x$ (33) $2\csc^2 x$ (35) $-\sin x$ (37) $\cot x$

SOLUTIONS

(24) $$\frac{1+\tan x}{1+\cot x} = \frac{\frac{\cos x}{\cos x}+\frac{\sin x}{\cos x}}{\frac{\sin x}{\sin x}+\frac{\cos x}{\sin x}} = \frac{\frac{\cos x+\sin x}{\cos x}}{\frac{\sin x+\cos x}{\sin x}} = \frac{\cos x+\sin x}{\cos x}\cdot\frac{\sin x}{\sin x+\cos x} = \frac{\sin x}{\cos x} = \boxed{\tan x}$$

(25) $$(\sec^2 x+\csc^2 x)-(\tan^2 x+\cot^2 x)$$
$$\sec^2 x+\csc^2 x-\tan^2 x-\cot^2 x$$
$$\underbrace{\sec^2 x-\tan^2 x}_{1}+\underbrace{\csc^2 x-\cot^2 x}_{1} = \boxed{2}$$

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

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

(29) $$\sin x\cdot\cos x\cdot\frac{\sin x}{\cos x}\cdot\frac{1}{\cos x}\cdot\frac{1}{\sin x} = \frac{\sin x}{\cos x} = \boxed{\tan x}$$

(30) $$\frac{\sec^2 y-\tan^2 y}{\sec y} = \frac{1}{\sec y} = \boxed{\cos y}$$

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

(32) $$\frac{\sec^2 x\csc x}{\quad} = \frac{1}{\cos^2 x}\cdot\frac{1}{\sin x}$$

(32) $\dfrac{\sec^2 x \csc x}{\sec^2 x + \csc^2 x} = \dfrac{\frac{1}{\cos^2 x}\cdot\frac{1}{\sin x}}{\frac{\sin^2 x}{\sin^2 x}\frac{1}{\cos^2 x} + \frac{1}{\sin^2 x}\frac{\cos^2 x}{\cos^2 x}} = \dfrac{\frac{1}{\cos^2 x \sin x}}{\underbrace{\frac{\sin^2 x + \cos^2 x}{\cos^2 x \sin^2 x}}} = \dfrac{1}{\cos^2 x \sin x}\cdot\dfrac{\cos^2 x \sin^2 x}{\underbrace{\sin^2 x + \cos^2 x}_{1}}$

$= \boxed{\sin x}$

(33) $\dfrac{1}{\sin^2 x} + \sec^2 x \cdot \cot^2 x = \dfrac{1}{\sin^2 x} + \dfrac{1}{\cos^2 x}\cdot\dfrac{\cos^2 x}{\sin^2 x} = \dfrac{1}{\sin^2 x} + \dfrac{1}{\sin^2 x} = \dfrac{2}{\sin^2 x}$

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

(35) $\dfrac{\sin x}{\cot^2 x} - \dfrac{\sin x}{\cos^2 x} = \sin x \cdot \dfrac{1}{\cot^2 x} - \dfrac{\sin x}{\cos^2 x} = \sin x \cdot \dfrac{\sin^2 x}{\cos^2 x} - \dfrac{\sin x}{\cos^2 x}$

$= \dfrac{\sin^3 x - \sin x}{\cos^2 x} = \dfrac{\sin x(\sin^2 x - 1)}{\cos^2 x}$

$= \dfrac{\sin x(-\cos^2 x)}{\cos^2 x}$

$= \boxed{-\sin x}$

(37) $\dfrac{\sec x}{\sin x} - \dfrac{\sin x}{\cos x} = \sec x \cdot \dfrac{1}{\sin x} - \dfrac{\sin x}{\cos x} = \dfrac{1}{\cos x}\cdot\dfrac{1}{\sin x} - \dfrac{\sin x}{\cos x}\dfrac{\sin x}{\sin x}$

$= \dfrac{1 - \sin^2 x}{\cos x \sin x} = \dfrac{\cos^2 x}{\cos x \sin x} = \boxed{\cot x}$