

AP Calc AB: 2.4A HW

2. $f(x) = x \cos x + 2 \tan x$

$$f'(x) = x \frac{d}{dx} \cos x + \cos x \frac{d}{dx} x + \frac{d}{dx} 2 \tan x$$

$$\boxed{= -x \sin x + \cos x + 2 \sec^2 x}$$

4. $y = 2 \sec x - \csc x$

$$y' = \frac{d}{dx} 2 \sec x - \frac{d}{dx} \csc x$$

$$\boxed{= 2 \sec x \tan x + \csc x \cot x}$$

6. $g(t) = 4 \operatorname{sect} t + \tan t$

$$g'(t) = \frac{d}{dt} 4 \operatorname{sect} t + \frac{d}{dt} \tan t$$

$$\boxed{= 4 \operatorname{sect} \tan t + \sec^2 t}$$

8. $y = u(\operatorname{acos} u + b \cot u)$

$$y' = u \cdot \frac{d}{du} (\operatorname{acos} u + b \cot u) + (\operatorname{acos} u + b \cot u) \frac{d}{du} u$$

$$\boxed{= u(-\operatorname{asin} u - b \csc^2 u) + \operatorname{acos} u + b \cot u}$$

10. $y = \sin \theta \cos \theta$

$$y' = \sin \theta \cdot \frac{d}{d\theta} \cos \theta + \cos \theta \cdot \frac{d}{d\theta} \sin \theta$$

$$\boxed{= -\sin^2 \theta + \cos^2 \theta}$$

$$= -(1 - \cos^2 \theta) + \cos^2 \theta$$

same answer.

$$\boxed{= 2 \cos^2 \theta - 1}$$

12. $y = \frac{\cos x}{1 - \sin x}$

$$y' = \frac{(1 - \sin x) \frac{d}{dx} \cos x - \cos x \cdot \frac{d}{dx} [1 - \sin x]}{(1 - \sin x)^2}$$

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

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

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

$$\boxed{= \frac{1}{(1 - \sin x)}}$$

14. $y = \frac{\sin t}{1 + \tan t}$

$$y' = \frac{(1 + \tan t) \frac{d}{dt} \sin t - \sin t \frac{d}{dt} [1 + \tan t]}{(1 + \tan t)^2}$$

$$\boxed{= \frac{(1 + \tan t)(\cos t) - \sin t \cdot \sec^2 t}{(1 + \tan t)^2}}$$

16. $y = x^2 \sin x \tan x$

$$y' = x^2 \sin x \cdot \frac{d}{dx} \tan x + \tan x \frac{d}{dx} x^2 \sin x$$

$$= x^2 \sin x \cdot \sec^2 x + \tan x \left[x^2 \frac{d}{dx} \sin x + \sin x \frac{d}{dx} x^2 \right]$$

$$= x^2 \sin x \sec^2 x + \tan x [x^2 \cos x + 2x \sin x]$$

$$18. \frac{d}{dx} \sec x = \frac{d}{dx} \frac{1}{\cos x}$$

$$\begin{aligned}& \frac{d}{dx} \frac{1}{\cos x} \\&= \frac{\cos x \frac{d}{dx} 1 - 1 \cdot \frac{d}{dx} \cos x}{\cos^2 x} \\&= \frac{\sin x}{\cos^2 x} \\&= \frac{\sin x}{\cos x} \cdot \frac{1}{\cos x} \\&= \boxed{\tan x \cdot \sec x}\end{aligned}$$

$$22. y = (1+x) \cos x$$

$$\begin{aligned}y' &= (1+x) \frac{d}{dx} \cos x + \cos x \frac{d}{dx} [1+x] \\&= (1+x)(-\sin x) + \cos x\end{aligned}$$

$$(1+0)(-\sin 0) + \cos 0 = 1$$

$$\boxed{y=1=x}$$

$$24. y = x + \tan x$$

where

$$\begin{aligned}y' &= \frac{d}{dx} x + \frac{d}{dx} \tan x \\&= 1 + \sec^2 x\end{aligned}$$

$$1 + \frac{1}{\cos^2 \pi} = 2$$

$$\boxed{y-\pi = 2(x-\pi)}$$