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AP Calc AB: 2.4A HW

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

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

$= -x\sin x + \cos x + 2\sec^2 x$

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

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

$= 2\sec x\tan x + \csc x\cot x$

6. $g(t) = 4\sec t + \tan t$

$g'(t) = \frac{\partial}{\partial t}4\sec t + \frac{\partial}{\partial t}\tan t$

$= 4\sec t\tan t + \sec^2 t$

8. $y = v(a\cos v + b\cot v)$

$y' = v\cdot\frac{\partial}{\partial v}(a\cos v + b\cot v) + (a\cos v + b\cot v)\frac{\partial}{\partial v}v$

$= v(-a\sin v - b\csc^2 v) + a\cos v + b\cot v$

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

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

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

$= -(1-\cos^2\theta) + \cos^2\theta$ ∴ same answer.

$= 2\cos^2\theta - 1$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\frac{\partial}{\partial x} \frac{1}{\cos x}$

$= \frac{\cos x \frac{\partial}{\partial x} 1 - 1 \cdot \frac{\partial}{\partial x} \cos x}{\cos^2 x}$

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

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

$\boxed{= \tan x \cdot \sec x}$

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

$y' = (1+x)\frac{\partial}{\partial x}\cos x + \cos x \frac{\partial}{\partial x}[1+x]$

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

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

$\boxed{y - 1 = x}$

24. $y = x + \tan x$

$y' = \frac{\partial}{\partial x} x + \frac{\partial}{\partial x} \tan x$

$= 1 + \sec^2 x$

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

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