3.3 Hw Solutions:

Nathan Warner

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Question 1:

Solution: 😊

Question 2:

Solution: 😊

Question 3:

Solution: 😊

Question 4:

Solution: 😊

Question 5:

Solution: 😊

Question 6:

Solution: 😊

$$f(x) = 2x$$
$$f'(x) = 2.$$

$$g(x) = 7 - tan(x)$$
$$g'(x) = -\sec^2 x.$$

Now:

$$\begin{aligned} F'(x) &= \frac{(7-\tan x)(2) - (2x)(-\sec^2 x)}{(7-\tan x)^2} \\ &= \frac{14 - 2\tan x + 2x\sec x}{(7-\tan x)^2} \\ &= \frac{2(7 - \tan x + x\sec^2 x)}{(7-\tan x)^2}. \end{aligned}$$

Question 7:

Solution: 😊

$$F(x) = \frac{1+\sec w}{1-\sec w}.$$

If:

$$f(w) = 1+\sec w$$
$$f'(x) = \sec w \tan w.$$

$$g(w) = 1-\sec w$$
$$g'(x) = -\sec w \tan w.$$

Then:

$$\begin{aligned} F'(w) &= \frac{(1-\sec w)(\sec w \tan w) - (1+\sec w)(-\sec w \tan w)}{(1-\sec w)^2} \\ &= \frac{\sec w \tan w[(1-\sec w) - (1+\sec w)(-1)]}{(1-\sec w)^2} \\ &= \frac{\sec w \tan w[(1-\sec w) + (-1-\sec w)(-1)]}{(1-\sec w)^2} \\ &= \frac{\sec w \tan w[1-\sec w+1+\sec w]}{(1-\sec w)^2} \\ &= \frac{\sec w \tan w[2]}{(1-\sec w)^2} \\ &= \frac{2\sec w \tan w}{(1-\sec w)^2} \end{aligned}$$

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Question 8:

Solution: 😊

<u>Part 1:</u>

$$f(t) = t$$
$$f'(t) = 1.$$

$$g(t) = \sin t$$
$$g'(t) = \cos t.$$

So:

$$\begin{aligned} F'(t) &= t \cdot \cos t + \sin t \cdot 1 \\ &= t\cos t + \sin t. \end{aligned}$$

<u>Part 2:</u>

$$\begin{aligned} G'(t) &= 0 + 1 \\ &= 1. \end{aligned}$$

Part 3:

$$\begin{aligned} F'(t) &= \frac{(1+t)(t\cos t + \sin t) - t\sin t}{(1+t)^2} \\ &= \frac{(1+t)(t\cos t + \sin t) - t\sin t}{(1+t)^2} \\ &= \frac{t\cos t + \sin t + t^2\cos t + t\sin t - t\sin t}{(1+t)^2} \\ &= \frac{t\cos t + \sin t + t^2\cos t}{(1+t)^2} \end{aligned}$$

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Question 9:

Solution: 😊

$$\begin{aligned} \frac{d}{dx}\csc x &= \frac{d}{dx}\frac{1}{\sin x} \\ &= \frac{\sin x \cdot 0 - 1 \cdot \cos x}{\sin^2 x} \\ &= \frac{-\cos x}{\sin^2 x} \\ &= \frac{1}{\sin x} \cdot \frac{\cos x}{\sin x} \\ &= -\csc x \cot x. \end{aligned}$$

Question 10:

Solution: 😊

$$\begin{aligned} f(x) &= 12x \\ f'(x) &= 12. \end{aligned}$$

$$\begin{aligned} g(x) &= \sin x \\ g'(x) &= \cos x. \end{aligned}$$

Now:

$$\begin{aligned} y' &= 12x \cdot \cos x + \sin x \cdot 12 \\ &= 12x\cos x + 12\sin x \\ &= 12(x\cos x + \sin x) \end{aligned}$$

Second part of a.)

$$\begin{aligned} &12(\frac{\pi}{2}\cos\frac{\pi}{2} + \sin\frac{\pi}{2}) \\ &= 12(\frac{\pi}{2}(0) + 1) \\ &= 12(1) \\ &= 12. \end{aligned}$$

With this:

$$\begin{aligned} y - y_1 &= m\,(x - x_1) \\ &\textit{so} \\ y - 6\pi &= 12(x - \frac{\pi}{2}) \\ y - 6\pi &= 12x - 6\pi \\ &= y = 12x. \end{aligned}$$

Question 11:

Solution: 😊

Question 12:

Solution: 😊

Question 13:

Solution: 😊

Question 14:

Solution: 😊