
Problem 8

By the Chain Rule, we have

$$F'(x) = 99(1 + x + x^2)^{98}(1 + 2x) = 99(1 + 2x)(1 + x + x^2)^{98}.$$

Problem 10

We have, by the chain rule,

$$g'(x) = \frac{3}{2}(2 - \sin x)^{1/2}(-\cos x) = -\frac{3 \cos x \sqrt{2 - \sin x}}{2}.$$

Problem 11

The outer function is $f(t) = \frac{1}{t^2}$ and the inside function is $g(t) = \cos t + \tan t$. This implies that

$$A(t) = f(g(t)).$$

Using the Chain Rule, we have

$$A'(t) = f'(g(t))g'(t).$$

Now, we have

$$f'(t) = (t^{-2})' = -2t^{-3} = -\frac{2}{t^3}.$$

Also, we have

$$g'(t) = -\sin t + \sec^2 t$$

and therefore

$$\begin{aligned} A'(t) &= -\frac{2}{(-\sin t + \sec^2 t)^3}(-\sin t + \sec^2 t) \\ &= -\frac{2}{(-\sin t + \sec^2 t)^2}. \end{aligned}$$

Problem 30

We use the chaine rule and we get

$$ds/dt = \frac{1}{2} \left(\frac{1 + \sin t}{1 + \cos t} \right)^{-1/2} \frac{d}{dx} \left(\frac{1 + \sin t}{1 + \cos t} \right).$$

The derivative of $(1 + \sin t)/(1 + \cos t)$ is

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

Thus, the final answer looks like

$$ds/dt = \frac{1 + \sin t + \cos t}{2(1 + \cos t)^{3/2}\sqrt{1 + \sin t}}.$$