Common Calculus Mistakes
Chain Rule: Power Rule

Some problems provide the opportunity for more than one mistake.

The Goal

Find

$$\frac{d}{dx}(1-e^x)^{\frac{3}{5}}$$

The Mistakes

Find the mistakes:

1.

$$\frac{d}{dx}(1-e^x)^{\frac{3}{5}} = \frac{3}{5}(1-e^x)^{-\frac{2}{5}}(1-e^x)$$

Need a hint? Look carefully at the red part:

$$\frac{d}{dx}(1-e^x)^{\frac{3}{5}} = \frac{3}{5}(1-e^x)^{-\frac{2}{5}}(1-e^x)$$

2.

$$\frac{d}{dx}(1-e^x)^{\frac{3}{5}} = \frac{3}{5}(1-e^x)^{-\frac{2}{5}}(e^x)$$

Need a hint? Look carefully at the red part:

$$\frac{d}{dx}(1-e^x)^{\frac{3}{5}} = \frac{3}{5}(1-e^x)^{-\frac{2}{5}}(e^x)$$

A Correct Solution

$$\frac{d}{dx}(1-e^x)^{\frac{3}{5}} = \frac{3}{5}(1-e^x)^{-\frac{2}{5}}(-e^x)$$

Explanations

In both mistakes the chain rule is not used correctly. The chain rule is:

$$\frac{d}{dx}f(g(x)) = f'(g(x))g'(x)$$

In this example $g(x) = 1 - e^x$.

In the first mistake $g'(x)$ was not computed, but instead $g(x)$ was left in its place.

In the second mistake $g'(x)$ was computed incorrectly; the minus sign in front of e^x in $g(x)$ appears to have been ignored. *Be careful with signs!*