

← Chain rule practice

Practice Quiz, 3 questions

✓ **Congratulations! You passed!**

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4.29 / 5
points

1.

Consider the function $h : \mathbb{R} \rightarrow \mathbb{R}$, where $h(t) = (f \circ g)(t) = f(g(t))$ with

$$g(t) = \mathbf{x} = \begin{bmatrix} t \cos t \\ t \sin t \end{bmatrix}, \quad t \in \mathbb{R}$$

$$f(\mathbf{x}) = \exp(x_1 x_2^2), \quad \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \in \mathbb{R}^2$$

☐ $\frac{dg}{dt} = \begin{bmatrix} \cos t - t \sin t \\ \sin t + t \cos t \end{bmatrix}$

**Correct**

Well done

☐ $\frac{dh}{dt} = \frac{df}{dg} \frac{dg}{dt}$

**This should be selected**

☐ $\frac{df}{d\mathbf{x}} = [x_1 x_2^2 \quad 2x_2 x_1 x_2^2]$

**Un-selected is correct**

☐ $\frac{dg}{dt} = \begin{bmatrix} \sin t - t \cos t \\ \cos t + t \sin t \end{bmatrix}$

**Un-selected is correct**

☐ $\frac{dh}{dt} = \cos t - t \sin t + 2t \sin t (\sin t + t \cos t)$

**Un-selected is correct**

☐ $\frac{df}{d\mathbf{x}} = [x_2^2 \exp(x_1 x_2^2) \quad 2x_1 x_2 \exp(x_1 x_2^2)]$

**Correct**

Yes, this is a row vector.

☐ $\frac{dh}{dt} = \exp(x_1 x_2^2) [x_2^2 (\cos t - t \sin t) + 2x_1 x_2 (\sin t + t \cos t)]$ with $x_1 = t \cos t$, $x_2 = t \sin t$

**Correct**

Yes, this is what we get when we apply the chain-rule. Well done!

1 / 1
points

2.

Compute $\frac{df}{dx}$ of the following function using the chain rule.

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$$a = x^2$$

$$b = \exp(a)$$

$$c = a + b$$

$$d = \log(c)$$

$$e = \sin(c)$$

$$f = d + e$$

☐ $\frac{df}{dx} = \frac{(1 + \cos(x^2 + \exp(x^2))(x^2 + \exp(x^2)))(2x + 2x \exp(x^2))}{x^2}$

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**Correct**

Excellent!

☐ $\frac{df}{dx} = \frac{(1 + \cos(x^2 + \exp(x^2))(x^2 + \exp(x^2)))(2x + 2x \exp(x^2))}{x^2 + \exp(x^2) + \log(x^3)}$

1 / 1
points

3.

What is $\frac{df}{dx}$ where

$$f = \cos(t^2)$$

$$t = x^3$$

☒ $-6x^5 \sin(x^6)$

**Correct**

Well done!

☐ $-6x \sin(x^6)$

☐ $6x^5 \sin(x^6)$

☐ $-\sin(x^6)$

