Chain rule

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Differentiate $(4x+3)^6$. [2 marks]

The outer derivative is $6(4x+3)^5$.

Multiply by 4.

Answer: $24(4x+3)^5$

2. Differentiate $(x^2-2x)^3$. [2 marks]

Differentiate the cube.

Multiply by the derivative of x^2-2x.

Answer: $3(x^2-2x)^2(2x-2)$

3. Differentiate $\frac{1}{x^2+1}$. [2 marks]

Write the function as $(x^2+1)^{-1}$.

Multiply the outer derivative by $2x$.

Answer: $-\frac{2x}{(x^2+1)^2}$

4. Differentiate $x(x+1)^4$. [3 marks]

Use the product rule to obtain $(x+1)^4 + 4x(x+1)^3$.

Factor and simplify.

Answer: $(x+1)^3(5x+1)$

5. Find the gradient of $y=(5-x)^3$ at $x=2$. [2 marks]

The derivative is $-3(5-x)^2$.

Substitute 2.

Answer: -27

6. Find the derivative of $y=\sqrt{2x-1}$ and state its domain. [3 marks]

The outer derivative is one half times power $-\frac{1}{2}$.

Multiply by 2; a finite derivative requires $2x-1>0$.

Answer: $\frac{1}{\sqrt{2x-1}}$ for $x>\frac{1}{2}$