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QUIZ 6 

MATH 200
September 12, 2023

Directions: Find the derivatives of the given functions. Perform any "obvious" simplifications.

1. $f(x) = 3 + 2x + 4x^3$

$$f'(x) = 0 + 2 + 4 \cdot 3x^2 = \boxed{2 + 12x^2}$$

2. $g(x) = \sqrt[4]{x} = x^{\frac{1}{4}}$

$$g'(x) = \frac{1}{4}x^{\frac{1}{4}-1} = \frac{1}{4}x^{-\frac{3}{4}} = \boxed{\frac{1}{4x^{3/4}}}$$
$$= \boxed{\frac{1}{4\sqrt[4]{x^3}}}$$

3. $y = \frac{1-\pi}{x} = (1-\pi)x^{-1}$

$$f'(x) = (1-\pi)(-1)x^{-1-1} = \boxed{\frac{\pi-1}{x^2}}$$

constant!

4. $g(x) = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{x}} = \frac{1}{\sqrt{2}} + x^{-\frac{1}{2}}$

$$g'(x) = 0 - \frac{1}{2}x^{-\frac{1}{2}-1}$$

constant!

$$= -\frac{1}{2}x^{-\frac{3}{2}}$$

$$= \boxed{-\frac{1}{2x^{3/2}}} = \boxed{\frac{-1}{2\sqrt{x^3}}}$$

Directions: Find the derivatives of the given functions. Perform any "obvious" simplifications.

1. $f(x) = 3 + 2x + 4x^3$

$$f'(x) = 0 + 2 + 4 \cdot 3x^2 = \boxed{2 + 12x^2}$$

2. $y = 8\sqrt[3]{x} = 8x^{\frac{1}{3}}$

$$\frac{dy}{dx} = 8 \cdot \frac{1}{3} x^{\frac{1}{3}-1} = \frac{8}{3} x^{-\frac{2}{3}} = \boxed{\frac{8}{3x^{2/3}}} = \boxed{\frac{8}{3\sqrt[3]{x^2}}}$$

3. $g(x) = \frac{x^5}{5+\sqrt{2}} = \frac{1}{5+\sqrt{2}} x^5$

$$g'(x) = \frac{1}{5+\sqrt{2}} 5x^4 = \boxed{\frac{5x^4}{5+\sqrt{2}}}$$

4. $g(x) = \frac{1}{\pi^2} + \frac{1}{x^2} = \frac{1}{\pi^2} + x^{-2}$

↑
constant!

$$g'(x) = 0 - 2x^{-2-1} = \boxed{-\frac{2}{x^3}}$$