

MAT 270 - Derivative Practice I Solutions

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

$$f'(x) = 12x^2 - 6x + 2$$

2. $f(x) = \frac{x^2}{3} - \frac{3}{x^2}$

$$f'(x) = \frac{2}{3}x + \frac{6}{x^3}$$

3. $f(x) = -3(2x^2 - 5x + 1)$

$$f'(x) = 12x + 15$$

4. $f(x) = \sqrt{x} - \frac{1}{\sqrt{x}}$

$$f'(x) = \frac{1}{2\sqrt{x}} + \frac{1}{2x\sqrt{x}}$$

5. $f(x) = \frac{x+1}{x-2}$

$$f'(x) = \frac{-3}{(x-2)^2}$$

6. $f(x) = \frac{x^2 - 2}{x^2}$

$$f'(x) = \frac{4}{x^3}$$

7. $f(x) = \frac{x^2}{x^2 - 2}$

$$f'(x) = \frac{-4x}{(x^2 - 2)^2}$$

8. $f(x) = \sqrt{x}(x^2 + 1)$

$$f'(x) = \frac{5x\sqrt{x}}{2} + \frac{1}{2\sqrt{x}}$$

$$9. \quad f(x) = \frac{e^x}{e^x - 1}$$

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

$$10. \quad f(x) = \frac{2}{\sqrt{x}} + \frac{\sqrt{x}}{2}$$

$$f'(x) = \frac{-1}{x\sqrt{x}} + \frac{1}{4\sqrt{x}}$$

$$11. \quad f(x) = \frac{2x}{x-1}$$

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

$$12. \quad f(x) = (3x-2)(2x+1)$$

$$f'(x) = 12x - 1$$

$$13. \quad y = 5x^2 - 5\sqrt{x} - \frac{3}{x}$$

$$y' = 10x - \frac{5}{2\sqrt{x}} + \frac{3}{x^2}$$

$$14. \quad y = \frac{\sqrt{x}}{\sqrt{x}-1}$$

$$y' = \frac{-1}{2\sqrt{x}(\sqrt{x}-1)^2}$$

$$15. \quad y = \frac{e^x}{x}$$

$$y' = \frac{e^x}{x} - \frac{e^x}{x^2}$$

$$16. y = 6x^{\frac{-3}{2}} + 7x^{\frac{1}{5}} + 1$$

$$y' = -9x^{\left(\frac{-5}{2}\right)} + \frac{7}{5}x^{\left(\frac{-4}{5}\right)}$$

$$17. y = \frac{-7}{1-x^3}$$

$$y' = \frac{-21x^2}{(1-x^3)^2}$$

$$18. y = \frac{4}{3}x^{\left(\frac{3}{4}-\pi\right)}$$

$$\left(1 - \frac{4}{3}\pi\right)x^{\left(\frac{-1}{4}-\pi\right)}$$

$$19. y = \frac{1}{7x}$$

$$y' = \frac{-1}{7x^2}$$

$$20. y = 2x^{\left(\frac{1}{2}-e\right)}$$

$$y' = (1-2e)x^{\left(\frac{-1}{2}-e\right)}$$

Bonus:

$$y = e^{\ln x^2} - 3x^{-7}$$

$$y' = \frac{2e^{\ln x^2}}{x} + \frac{21}{x^8}$$