<u>Homework Questions 5 – Expanding and Simplifying</u>

Use standard results to differentiate after first expanding or simplifying the function

1. $y = 3(2x - x^2)$

$$\frac{dy}{dx} = 6 - 6x$$

2. $f(x) = x(x + 1)$

$$f'(x) = 2x + 1$$

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

$$f'(x) = 8x + 12$$

4. $y = x(2x + 3)^2$

$$\frac{dy}{dx} = 12x^2 + 24x + 9$$

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

$$\frac{dy}{dx} = 6x + 3$$

6. $f(x) = 2x^2(4x - 3)$

$$f'(x) = 24x^2 - 12x$$

7. $f(x) = \dfrac{12x^5}{6x}$

$$f'(x) = 8x^3$$

8. $y = \dfrac{x^2 - x}{x}$

$$\frac{dy}{dx} = 1$$

9. $y = \dfrac{3x^2 - 4x}{x}$

$$\frac{dy}{dx} = 3$$

10. $f(x) = \dfrac{3x^4 + 4x^2 + 6x}{2x}$

$$f'(x) = \frac{9}{4}x^2 + 2$$

11. $f(x) = \sqrt[3]{x}$

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

12. $y = \sqrt[4]{x}$

$$\frac{dy}{dx} = \frac{1}{4}x^{-\frac{3}{4}}$$

13. $y = 3x - \sqrt{x} + x^2$

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

14. $f(x) = \dfrac{x^2 + x}{\sqrt{x}}$

$$f'(x) = \frac{3}{2}x^{\frac{1}{2}} + \frac{1}{2}x^{-\frac{1}{2}}$$

15. $f(x) = \dfrac{3x^4 - 2x^2}{\sqrt[3]{x}}$

$$f'(x) = 11x^{\frac{8}{3}} - \frac{10}{3}x^{\frac{2}{3}}$$

16. $f(x) = -\dfrac{2}{\sqrt{x}}$

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

17. $y = \dfrac{x^2 - 3x}{2x^4}$

$$\frac{dy}{dx} = -x^{-3} + \frac{9}{2}x^{-4}$$

18. $y = x^3 - \dfrac{1}{2x^2} + \dfrac{4}{x^3}$

$$\frac{dy}{dx} = 3x^2 + x^{-3} - 12x^{-4}$$

19. $f(x) = (2x - 3)(x - 4)$

$$f'(x) = 4x - 11$$

20. $f(x) = (x + 4)^2 + 2x^2$

$$f'(x) = 6x + 8$$