| **Year 12 Extension 1** | **Differentiation Revision Assignment** | **Date Due:** |

For questions 1 – 20, differentiate each function with respect to x.

1. $y = (x + 6)(x^2 + 3)$

2. $y = 2x^2(x^2 - 5)$

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

4. $y = \sqrt{2x + 8}$

5. $y = \dfrac{1}{x + 1}$

6. $y = \dfrac{2x + 1}{2x - 1}$

7. $y = \dfrac{x^2}{1 - x^2}$

8. $y = \dfrac{1}{(2x + 3)^5}$

9. $y = x^{\frac{2}{3}}$

10. $y = (x^2 + 1)(x^2 - 6)$

11. $y = \sqrt{4x - 1}$

12. $y = \dfrac{x}{x + 1}$

13. $y = (3 - 2x)^4$

14. $y = \dfrac{1}{(2 - 3x)^4}$

15. $y = (x + 1)\sqrt{x}$

16. $y = x^3(1 + x)^3$

17. $y = \dfrac{5x - 2}{3x + 5}$

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

19. $y = \dfrac{x}{\sqrt{x^2 + 1}}$

20. $y = (x + 1)^2(x + 2)^3$

21. Find the equation of the tangent to the curve $y = \dfrac{2}{x + 1}$ at the point where $x = 3$.

22. Find the slope of the curve $y = \dfrac{2}{x^2 + 1}$ at the origin. Find the equation of the tangent and the normal at the origin.

23. Find the point where the curve $y = (2x - 5)^3$ cuts the x-axis and find the slope of the tangent at this point.

24. Find the equation of the tangent to the curve $y = \dfrac{x^2}{4 - x}$ at the point (2, 2)

25. Differentiate each of the following functions with respect to x.

(a) $f(x) = \dfrac{x}{\sqrt{x}}$ (b) $f(x) = (2x + 1)^2(5x - 4)^3$ (c) $f(x) = \dfrac{4x}{\sqrt{2x}}$

26. Find the equations of the tangent and normal to the curve $y = x^{\frac{3}{2}}$ at the point (4, 8).

If the tangent meets the x-axis at T and the normal meets the x-axis at N, show that TN $= 26^{\frac{2}{3}}$