Show all work and circle/box your final answer. All answers must be simplified unless stated otherwise.

Differentiation Rules:

- $\dfrac{d}{dx}(x^n) = nx^{n-1}$

- $\dfrac{d}{dx}kf(x) = kf'(x)$

- $\dfrac{d}{dx}(f(x) \pm g(x)) = f'(x) \pm g'(x)$

- $\dfrac{d}{dx}(f(x))^n = n(f(x))^{n-1}f'(x)$

---

1. Find the derivatives of the following functions (you do not need to simplify your answers):

   (a) $x^5 + 3x^4 + 2x^2 + 5x + 1$

   (b) $\dfrac{\sqrt{x}}{4}$

   (c) $\sqrt[3]{2x+1}$

   (d) $(4x+5)^2$

   (e) $4(x^5 + 2x^4 + 9)^3$

2. Find the first and second derivatives of the following functions (you do not need to simplify your answers):

   (a) $f(x) = -x^2 + 3$

   (b) $f(x) = \dfrac{x^3}{3} + \dfrac{x^2}{2} + \dfrac{x}{4}$

   (c) $r(x) = \dfrac{2}{x^3} - \dfrac{3}{x^2} + \dfrac{1}{x}$

3. Find the equation of the line tangent to $f(x) = x^3 + 4x^2 + 1$ at $x = 1$.