

Please clearly show all your work on the following problems.

1) Find each of the following limits.

$$\lim_{x \rightarrow 2} \frac{x^2 + 4}{x - 5} = \frac{4 + 4}{2 - 5} = \frac{8}{-3} = -\frac{8}{3}$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = \lim_{x \rightarrow 2} \frac{(x - 2)(x + 2)}{x - 2} = \lim_{x \rightarrow 2} (x + 2) = 4$$

2) Find each of the following derivatives.

$$\frac{d}{dx} (x^6 + 4x^3 + 7) = 6x^5 + 12x^2$$

$$\frac{d}{dx} e^{\sin(x^2+2x)} = e^{\sin(x^2+2x)} \cdot \cos(x^2 + 2x) \cdot (2x + 2)$$

3) Find each of the following integrals.

$$\int_1^2 4x^3 + 7 dx = x^4 + 7x \Big|_1^2 = (2^4 + 14) - (1 + 7) = 30 - 8 = 22$$

$$\int 2x(x^2 + 1)^5 dx = \int u^5 du = \frac{u^6}{6} + C = \frac{(x^2 + 1)^6}{6} + C$$

$$u = x^2 + 1$$

$$du = 2x dx$$