Math 1A

Math 1A Worksheet 30 - 4/16/2025

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(1) Find the following general indefinite integrals

(a)
$$\int \frac{\sin(x)}{2} dx = -\frac{1}{2} \cos(x) + C$$

(b)
$$\int \frac{2}{x^2} dx = -\frac{2}{x} + C$$

(c)
$$\int \frac{2 - x^2}{x^3} dx = -\frac{1}{x^2} - \ln|x| + C$$

(d)
$$\int \frac{\sin(x)}{1 - \sin(x)^2} dx = \sec(x) + C$$

(e)
$$\int (e^{4x+3} - 1) dx = \frac{1}{4} e^{4x+3} - x + C$$

(f)
$$\int \frac{1}{x^2 + 4x + 5} dx = \int (\frac{1}{x+2})^2 dx = \operatorname{Con}(x+2) + C$$

(2) Use the Fundamental Theorem of Calculus to compute

$$\frac{d}{dx} \left(\int_{x-1}^{x^2-x} t^2 - 2t + 1 dt \right) - (x-1)^2 - 2(x-1)(1)$$

(3) Find the area of the region between the x-axis and the graph of $g(x) = \frac{x}{e^2} + \frac{1}{x}$ from $\int_{e}^{e^2} \frac{x}{e^2} + \frac{1}{2} \frac{x}{e^2}$

(4) Find the area of the region between the x-axis and the graph of f(x) = x³ - 2x² - 5x + 6 from x = 0 to x = 4, pay attention to where the function switches signs in order to get area.