

1. Evaluate

(a) $\int (5x^3(x^4-1)^{-2/3}) dx$

(b) $\int \left(3\sqrt[3]{t} - \frac{4}{t^3} + 5t^2 - \cos t + 2 \right) dt$

2. Solve the following differential equation.

$$\frac{dy}{dx} = \frac{(x^2 - \sqrt{x})}{2y^3} \quad \text{such that } y = -1 \text{ when } x = 1$$

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

Find the asymptotes, if they exist.

Vertical asymptote(s): _____

Oblique/Horizontal asymptote(s): _____

4. For the function $f(x) = \frac{4x-1}{x-4}$ on the closed interval $[-1, 3]$, decide whether or not the Mean Value Theorem for Derivatives applies. If it does, find all possible values of c . If not, then state the reason.

MVT applies: True or False

If true, then $c =$ _____

If false, then why? _____

5. Evaluate this integral. $\int \frac{(2x+3)^2}{\sqrt{x}} dx$

6. Evaluate the definite integral **using the definition** (the tedious way).

$$\int_0^2 3x^2 dx .$$

7. (a) Find $\frac{dG}{dx}$, when $G(x) = \int_1^{x^2+x} \sqrt{2z + \sin z} dz$.

(b) Find $\frac{dG}{dx}$, when $G(x) = \int_{\cos(x)}^{\sin(x)} t^5 dt$.

8. Find the average value of $f(x)$ on the interval $[0, 2\pi]$, where $f(x) = \frac{\sin x \cos x}{\sqrt{1 + \cos^2 x}}$.

9. Solve $x^4 - 53 = 0$ using Newton's Method, accurate to five decimal places.