

Review

SHOW ALL OF YOUR WORK AND CIRCLE YOUR ANSWERS.

1. Find the derivative: $f(x) = \ln \frac{x(x^2 + 5)}{\sqrt{x^3 - 5}}$.

- a. $\frac{1}{x} + \frac{2x}{x^2 + 5} - \frac{3x^2}{2(x^3 - 5)}$
- b. $\frac{x^2 + 5}{x} + \frac{2x^2}{x^2 + 5} + \frac{3x^2}{2(x^3 - 5)}$
- c. $\frac{x^2 + 5}{x} + \frac{2x^2}{x^2 + 5} - \frac{3x^2}{2(x^3 - 5)}$
- d. $\frac{1}{x} + \frac{2x}{x^2 + 5} + \frac{3x^2}{2(x^3 - 5)}$
- e. None of these

2. Evaluate the integral: $\int \frac{x + 2}{x + 1} dx$.

- a. $\frac{x^2 + 4x}{x + 1} + C$
- b. $\frac{x^2 + 2x}{2x + C}$
- c. None of these
- d. $x + C$
- e. $x + \ln|x + 1| + C$

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3.

Given $f(x) = \sqrt{3x^3 - 1}$, find $f^{-1}(x)$.

a. None of these

b.
$$\sqrt[3]{\frac{x^2}{3} + 1}$$

c.
$$\sqrt[3]{\frac{x^2 + 1}{3}}, x \geq 0$$

d.
$$\sqrt[3]{\frac{3}{x^3} - 1}$$

e.
$$\frac{1}{\sqrt{3x^3 - 1}}$$

4.

Evaluate the indefinite integral: $\int \frac{1}{x^2 e^{3/x}} dx.$

a.
$$\frac{1}{-x e^{-3/x}} + C$$

b.
$$\frac{1}{-e^{-3/x}} + C$$

c.
$$\frac{1}{-e^{3/x}} + C$$

d. None of these

e.
$$\frac{1}{-x e^{3/x}} + C$$

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5.

Differentiate: $y = x^e$.

a. None of these

b. x^{-1}

$e^x x^e$

c. e^x

d.
$$\left[\begin{array}{l} x e^x \\ x^e \left(\frac{1}{x} + (\ln x) (e^x) \right) \end{array} \right]$$

e. $x e^x + e^x$

6. A radioactive element has a half-life of 40 days. What percentage of the original sample is left after 48 days?

a. None of these

b. 43.53%

c. 37.50%

d. 25.00%

e. 49.56%

7. Find the general solution to the first-order differential equation:

$$(4 - x)dy + 2y dx = 0.$$

a. $y^4(4 - x^2) = C$

b. $y = C(4 - x)^2$

c. $4y - x^2y + xy = C$

d. None of these

e. $y(4 - x^2) = C$

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8.

Find y' : $y = \arctan \sqrt{t}$.

a. None of these

b. $\frac{1}{1+t}$

c. $\frac{1+t}{1}$

d. $\frac{2\sqrt{t(1-t)}}{1}$

e. $\frac{\sec^2 \sqrt{t}}{2\sqrt{t}}$

9.

Evaluate the integral: $\int \frac{1}{2x\sqrt{4x^2-1}} dx$.

a. $\frac{1}{2} \arcsin|2x| + C$

b. $\frac{1}{8} \sqrt{4x^2-1} + C$

c. $\frac{1}{2} \operatorname{arcsec}|2x| + C$

d. None of these

e. $\operatorname{arcsec}|2x| + C$

10.

Evaluate the integral: $\int \cosh(2-3x) dx$.

a. $-3 \sinh(2-3x) + C$

b. $\frac{1}{3} \sinh(2-3x) + C$

c. $-\frac{1}{3} \sinh(2-3x) + C$

d. None of these

e. $\sinh(2-3x) + C$