

Integrals and Natural Logarithms #4 - Answers

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Name _____

Instructions

Answers appear on the ANSWERS page. Solutions appear on the SOLUTIONS page.

1. $\int (15x^4 + 12x^3 + 8x + 3\sqrt{x} + 2) dx = 3x^5 + 3x^4 + 4x^2 + 2x^{\frac{3}{2}} + 2x + C$

2. $\int (4 \sin(x) + 3 \csc(x) \cot(x)) dx = -4 \cos(x) - 3 \csc(x) + C$

3. $\int_{x=0}^{x=2} (6x^2 + 9x + 1) dx = 36$

4. $\int (5x^2 + 10x + 2)^{10} (x + 1) dx = \frac{1}{110} (5x^2 + 10x + 2)^{11} + C$

5. $\int \cos(8x^3 + 3x^2) (4x^2 + x) dx = \frac{1}{6} \sin(8x^3 + 3x^2) + C$

6. $\int \frac{\cos(x)}{\sin(x)+5} dx = \ln |\sin(x) + 5| + C$

7. $\frac{d}{dx} [\ln(\sec(x))] = \tan(x)$

8. $\frac{d}{dx} [\ln(10x^3 - 8x^2 + 4x)] = \frac{30x^2 - 16x + 4}{10x^3 - 8x^2 + 4x} = \frac{15x^2 - 8x + 2}{5x^3 - 4x^2 + 2x}$

9. $\frac{d}{dx} \left[\ln \left(\sqrt{\frac{x^2}{\sin(x)}} \right) \right] = \frac{1}{2} \left(\frac{2x}{x^2} - \frac{\cos(x)}{\sin(x)} \right) = \frac{1}{x} - \frac{1}{2} \cot(x)$

Alternatively:

$$\frac{d}{dx} \left[\ln \left(\sqrt{\frac{x^2}{\sin(x)}} \right) \right] = \frac{1}{\left(\frac{x^2}{\sin(x)} \right)^{\frac{1}{2}}} \frac{1}{2} \left(\frac{x^2}{\sin(x)} \right)^{-\frac{1}{2}} \frac{2x \sin(x) - x^2 \cos(x)}{\sin^2(x)}$$

10. Compute: $\int_{x=-1}^{x=1} (x^5 + 1)^3 x^4 dx = \frac{4}{5}$