Integration Problems With Explanations

Joe Godinez

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1.

$$\int 5x(1-4x^2)^{20}\,\mathrm{d}x$$

Correct Choices: Reverse Chain Rule, U-Substitution

Potential Incorrect Choices: Reverse Power Rule, Trig Substitution, By Parts

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2.

$$\int \frac{1}{\sqrt{x^2+4}}\,\mathrm{d}x$$

Correct Choices: Trig Substitution

Potential Incorrect Choices: U-Substitution, Algebraic Simplification

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3.

$$\int x\,\cos(x^2)\,\mathrm{d}x$$

Correct Choices: U-Substitution

Potential Incorrect Choices: By Parts, Trig Identity

4.

$$\int \tan(x)\sec^3(x)\,\mathrm{d}x$$

Correct Choices: Trig Identity

Potential Incorrect Choices: By Parts, Reverse Chain Rule

5.

$$\int \frac{(5x+1)}{(x+3)^2}\,\mathrm{d}x$$

Correct Choices: Partial Fractions

Potential Incorrect Choices: Long Division, Algebraic Simplification

6.

$$\int e^x \sin(2x)\,\mathrm{d}x$$

Correct Choices: By Parts

Potential Incorrect Choices: Trig Identity, Reverse Chain Rule

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7.

$$\int \frac{x^3 - 4x^2 - 24}{x - 5}\,\mathrm{d}x$$

Correct Choices: Long Division

Potential Incorrect Choices: Partial Fractions, Algebraic Simplification

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8.

$$\int x^4 \ln(x)\,\mathrm{d}x$$

Correct Choices: By Parts

Potential Incorrect Choices: U-Substitution, Algebraic Simplification, Derivative Definition for Natural Log

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9.

$$\int \sin^3(x)\cos^3(x)\,\mathrm{d}x$$

Correct Choices: Trig Identity

Potential Incorrect Choices: By Parts, Reverse Chain Rule, U-Substitution

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10.

$$\int \ln(300x)\,\mathrm{d}x$$

Correct Choices: By Parts

Potential Incorrect Choices: Reverse Chain Rule, U-Substitution, Algebraic Simplification

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11.

$$\int \frac{1}{1 - 10x}\,\mathrm{d}x$$

Correct Choices: U-Substitution, Reverse Chain Rule

Potential Incorrect Choices: Algebraic Simplification, Long Division

12.

$$\int \cos^3(4x)\sin(4x)\,\mathrm{d}x$$

Correct Choices: U-Substitution, Reverse Chain Rule, Trig Identity

Potential Incorrect Choices: By Parts

13.

$$\int x^e + e^x + e^e\,\mathrm{d}x$$

Correct Choices: Reverse Power Rule

Potential Incorrect Choices: Algebraic Simplification

14.

$$\int \frac{1}{3}x^3 - 9x + \pi\,\mathrm{d}x$$

Correct Choices: Reverse Power Rule, U-Substitution Term-by-Term

Potential Incorrect Choices: Algebraic Simplification

15.

$$\int xe^{3x}\,\mathrm{d}x$$

Correct Choices: By Parts

Potential Incorrect Choices: U-Substitution, Reverse Chain Rule

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16.

$$\int \frac{1}{100 - 81x^2}\,\mathrm{d}x$$

Correct Choices: Trig Substitution

Potential Incorrect Choices: Algebraic Simplification, Derivative Definition of Natural Log

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17.

$$\int \frac{10x^3 - x^7 - 5x^{11}}{5x^8}\,\mathrm{d}x$$

Correct Choices: Algebraic Simplification

Potential Incorrect Choices: Partial Fractions, Long Division

18.

$$\int \frac{12x^3 - 2x^4 - x^5}{3x^4} \, \mathrm{d}x$$

Correct Choices: Algebraic Simplification

Potential Incorrect Choices: Partial Fractions, Long Division

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19.

$$\int \frac{1}{x(x+1)(x-3)} \, \mathrm{d}x$$

Correct Choices: Partial Fractions

Potential Incorrect Choices: Long Division, Algebraic Simplification, Trig Substitution

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20.

$$\int \frac{6x^3 + 20x^2 - 21}{3x + 7} \, \mathrm{d}x$$

Correct Choices: Long Division

Potential Incorrect Choices: Partial Fractions, Algebraic Simplification

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