

(1)

Sample question: Evaluate $\int \frac{1-x^2}{x(3x^2+10)} dx$.

Student's first step: $\frac{1-x^2}{x(3x^2+10)} = \frac{A}{x} + \frac{B}{3x^2+10}$.

(a) What would your first step have been instead?

(b) Explain why the student's first step will lead to trouble in the next few steps. (If you are not sure, carry out the next few steps to find the problem.)

(2) Write a correct **form** to set up the integrand $\frac{12x^4 - 100x + 1}{(x^3 - x)(x^3 + x)}$ for partial fractions.

(No need to solve for the constants.)

(3) Evaluate $\int x \sec^2(x) dx$.

Final answer:

(4) Evaluate $\int \frac{1}{x^2 \sqrt{x^2 + 9}} dx$.

Final answer:

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(5) **Student work:** $\int_{-2}^2 \frac{x+2}{x^2+4x+3} dx = \left[\frac{1}{2} \ln |x^2+4x+3| \right]_{-2}^2 = \frac{1}{2} (\ln 15 - \ln 1) = \frac{\ln 15}{2}$

(a) What's wrong with this solution?

(b) Fix it: evaluate that integral or show that it diverges.

(6) Solve for y from the equation $t + (2y\sqrt{t^2 + 1}) \frac{dy}{dt} = 0$, given that $y = 1$ at time $t = 0$.

Final answer:

(7) Evaluate $\int \sin^{16}(x) \cos^3(x) dx$.

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(8) Find the volume of the infinite solid created when e^{-x} is revolved around the x -axis, for $x \geq 4$.

First sketch it.

Then solve it.

Final answer:

(9) (a) Use integration by parts to evaluate $\int \ln x \, dx$.

(b) Now, using your answer from the last part, evaluate $\int (\ln x)^2 \, dx$.

1	2	3	4	5	6	7	8	9	TOTAL
[10]	[10]	[10]	[10]	[12]	[12]	[10]	[12]	[14]	[100]