

AP Calculus AB - Integration by Substitution - Test

Common Core AP CALC AB 6.9, AP CALC AB 6.10, AP CALC AB 6.11, AP CALC AB 6.12, AP CALC AB 6.14 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

This test checks integration by u-substitution for indefinite and definite integrals, long division, completing the square and choosing a technique (AP Calculus AB, 6.9 to 6.14). It has 8 questions worth 20 points in total. Allow 45 minutes, work without notes, and show all work, since justification earns points on the AP exam.

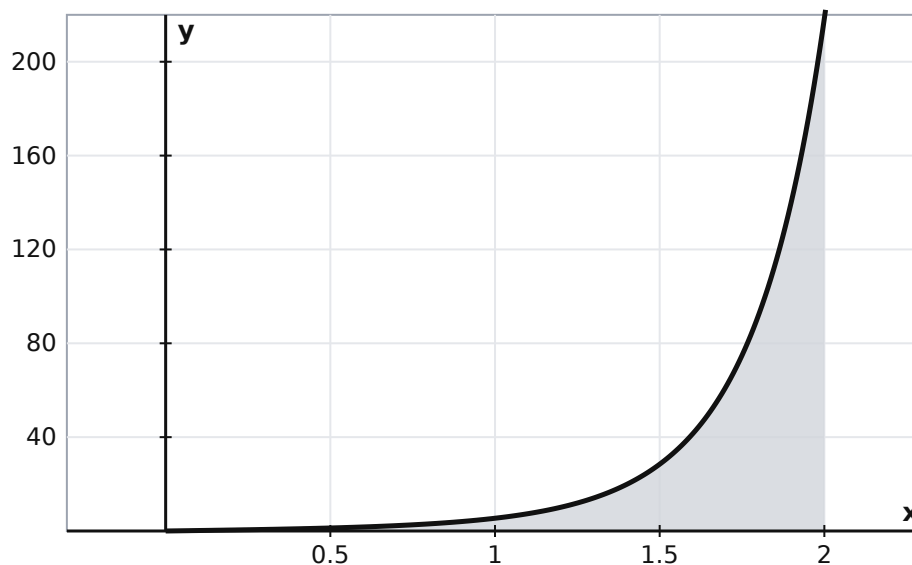
About this test

- Grade: AP Calculus AB
- Chapter: Integration by Substitution
- Standards: AP CALC AB 6.9, AP CALC AB 6.10, AP CALC AB 6.11, AP CALC AB 6.12, AP CALC AB 6.14
- Time: 45 minutes
- Total: 20 points

Question 1 - Indefinite substitution [2 pts]

Find $\int 3x^2(x^3-5)^4 dx$.

Question 2 - Definite substitution [3 pts]



The graph of $f(x) = 2x e^{(x^2)}$.

Evaluate $\int_0^2 2xe^{x^2} dx$ (the shaded area). Show the change of limits.

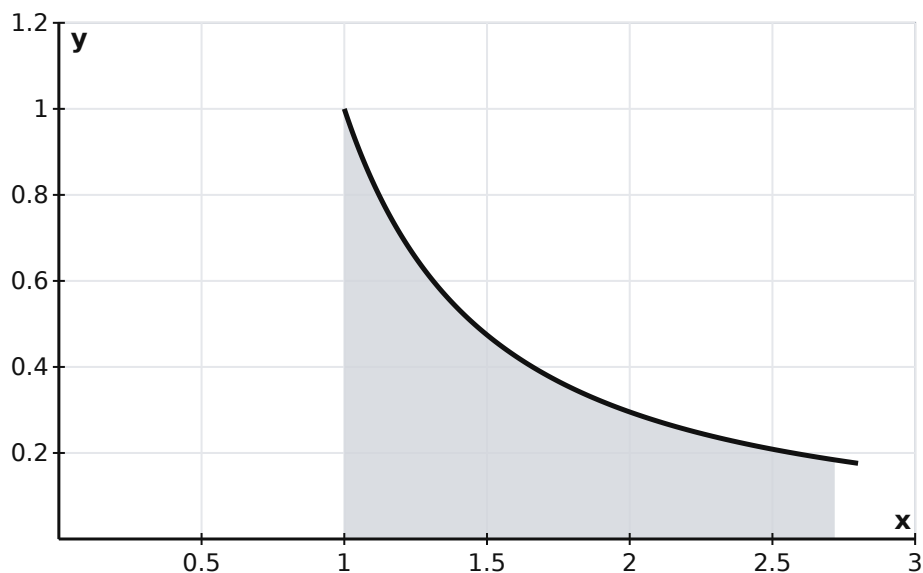
Question 3 - Exponential substitution [2 pts]

Find $\int e^{3x+1} dx$.

Question 4 - Trigonometric substitution [3 pts]

Evaluate $\int_0^{\pi/2} \cos x \sin^3 x dx$.

Question 5 - Logarithm form [3 pts]



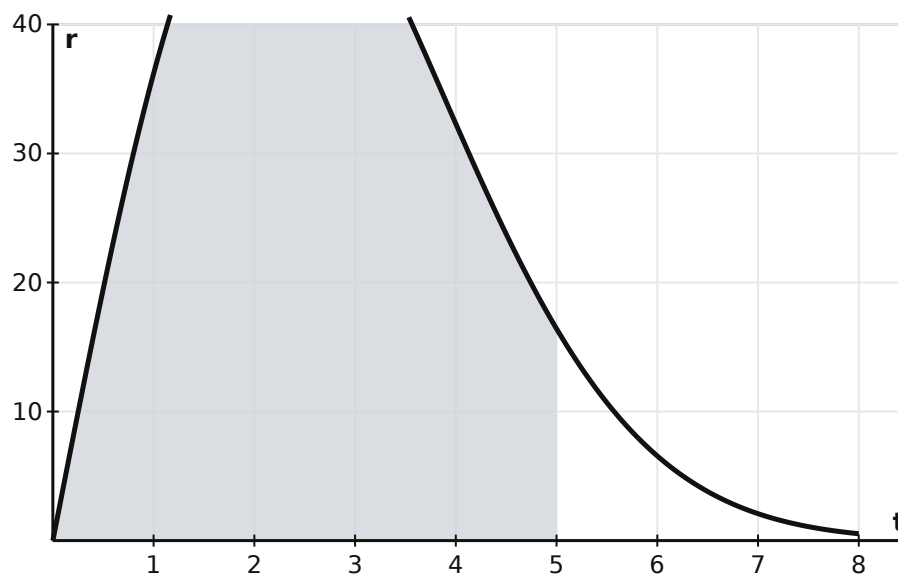
The graph of $f(x) = 1/(x(1 + \ln x))$.

Evaluate $\int_1^e \frac{1}{x(1 + \ln x)} dx$.

Question 6 - Long division [2 pts]

Find $\int \frac{x^2+5}{x+2} dx$.

Question 7 - Inflow of water [3 pts]



Inflow rate in gallons per minute.

Water flows into a tank at $r(t) = 40te^{-t^2/10}$ gallons per minute. (a) Write an integral for the

water added in the first 5 minutes. (1 point) (b) Evaluate it exactly. (2 points)

Question 8 - Choosing a technique [2 pts]
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Name the technique and give the antiderivative: (a) $\int x \cos(x^2) dx$ (b) $\int \frac{x^2+1}{x} dx$. (1 point each)