

AP Calculus AB - Fundamental Theorem of Calculus and Antiderivatives - Test

Common Core AP CALC AB 6.4, AP CALC AB 6.5, AP CALC AB 6.6, AP CALC AB 6.7, AP CALC AB 6.8 · maths-pdf.fr/en/

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

This test checks accumulation functions, both parts of the Fundamental Theorem of Calculus, basic antiderivatives and initial value problems (AP Calculus AB, 6.4 to 6.8). 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: Fundamental Theorem of Calculus and Antiderivatives
- Standards: AP CALC AB 6.4, AP CALC AB 6.5, AP CALC AB 6.6, AP CALC AB 6.7, AP CALC AB 6.8
- Time: 45 minutes
- Total: 20 points

Question 1 - Indefinite integral [2 pts]

Find $\int (8x^3 - 6x + \frac{1}{x}) dx$.

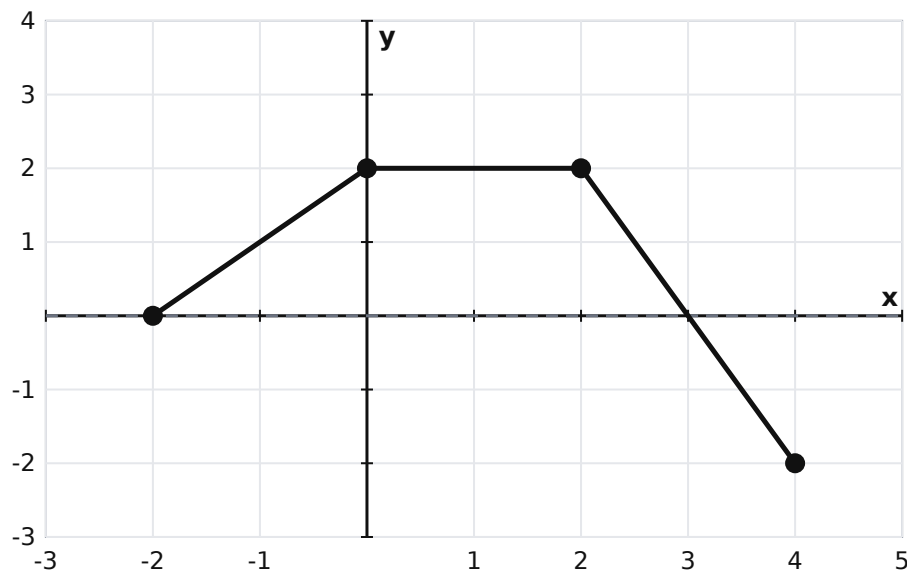
Question 2 - Definite integral [2 pts]

Evaluate $\int_0^{\pi/2} (\cos x + 2) dx$.

Question 3 - FTC with the chain rule [3 pts]

Let $G(x) = \int_1^{x^3} \sqrt{1+t^2} dt$. (a) Find $G'(x)$. (2 points) (b) Find $G'(1)$. (1 point)

Question 4 - Accumulation from a graph [3 pts]



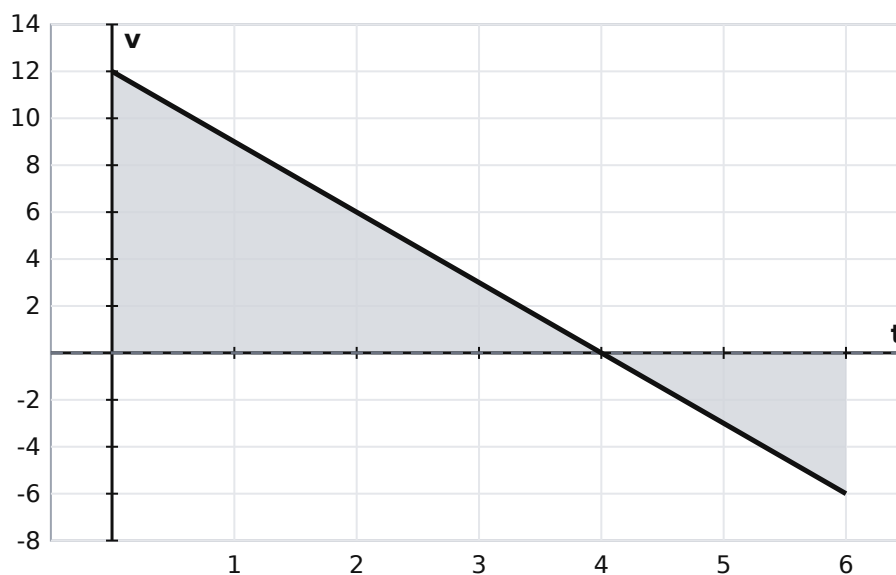
The graph of f .

The graph shows f . Let $g(x) = \int_0^x f(t) dt$. (a) Find $g(2)$ and $g(-2)$. (2 points) (b) At what x in $(-2, 4)$ does g have a relative maximum? Justify. (1 point)

Question 5 - Initial value problem [2 pts]

Find $f(x)$ if $f'(x) = 4x^3 - 3$ and $f(2) = 10$.

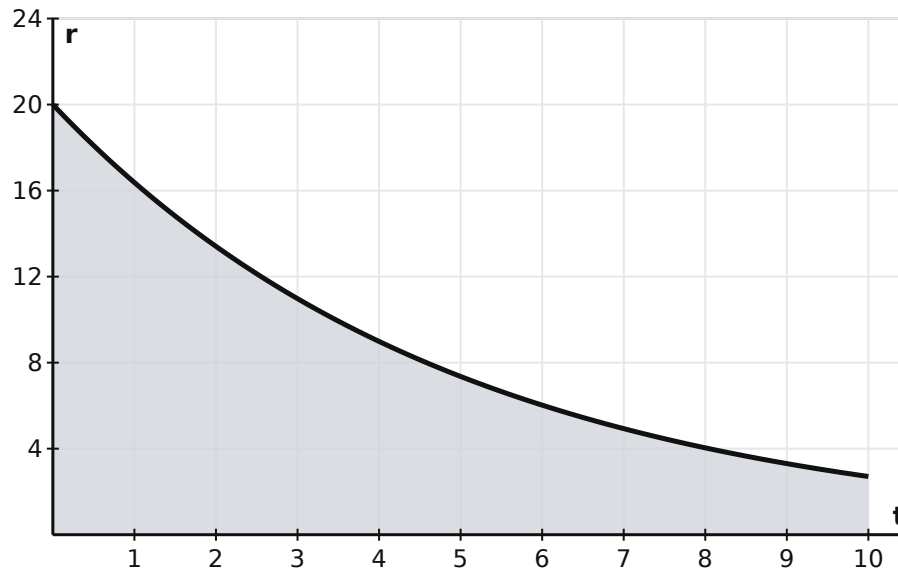
Question 6 - Motion with integrals [3 pts]



Velocity in feet per second.

A skater has velocity $v(t) = 12 - 3t$ ft/s for $0 \leq t \leq 6$ and position $s(0) = 5$. (a) Find $s(t)$. (1 point)
(b) Find the displacement on $[0, 6]$ with an integral. (1 point) (c) Find the total distance. (1 point)

Question 7 - Net change in context [3 pts]



Leak rate in gallons per hour.

Oil leaks from a tank at the rate $r(t) = 20e^{-0.2t}$ gallons per hour. (a) Write an integral for the amount that leaks during the first 10 hours. (1 point) (b) Evaluate it exactly and to two decimals. (2 points)

Question 8 - Properties [2 pts]

If $\int_2^6 f(x) \, dx = 9$ and $F' = f$ with $F(2) = 4$, find $F(6)$ and $\int_6^2 3f(x) \, dx$.