

AP Calculus AB · Applications of Integration · Test

Common Core AP Calculus AB Unit 8 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This ap calculus applications integration test checks applications of integration in 45 minutes, with 8 questions for a total of 20 points.

This free-response style test covers average value, particle motion, area between curves, cross sections, washers and accumulation. It has 8 questions worth 20 points. Show each setup; the integral and limits earn credit even if arithmetic slips.

Test information

- **Grade:** AP Calculus AB
- **Chapter:** Applications of Integration
- **Common Core:** AP Calculus AB Unit 8
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 3 pts; Question 3: 2 pts; Question 4: 2 pts; Question 5: 3 pts; Question 6: 3 pts; Question 7: 3 pts; Question 8: 2 pts)

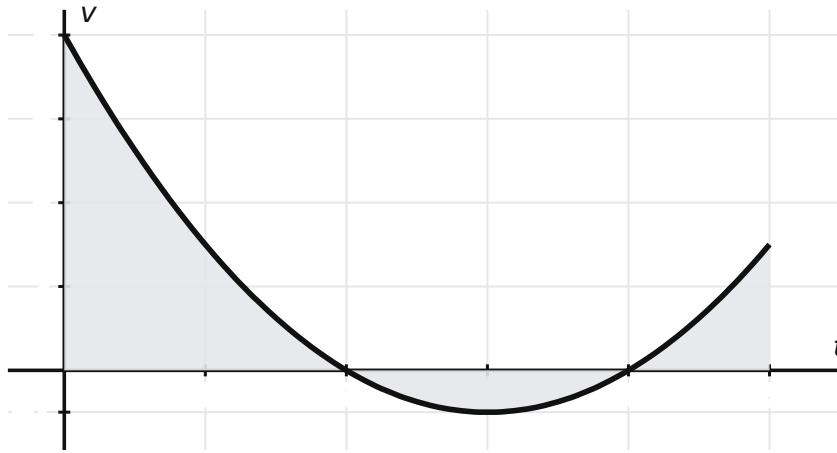
AP Calculus Applications Integration Test: questions 1-5

Question 1: Average value (2 points)

Let $f(x) = x^3$ on $[0, 2]$.

- Find the average value of f . (1 point)
- Find the value of c in $(0, 2)$ where $f(c)$ equals that average. Round to three decimal places. (1 point)

Question 2: Particle motion (3 points)

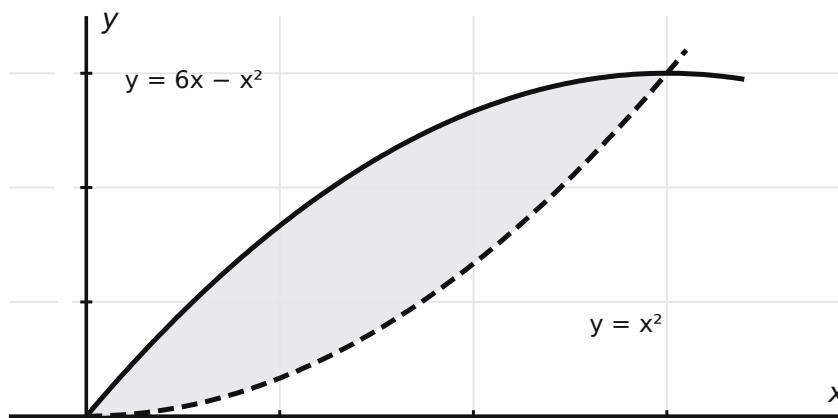


Velocity of a particle.

A particle moves on a line with velocity $v(t) = t^2 - 6t + 8$ for $0 \leq t \leq 5$, and $s(0) = 1$.

- Find the position $s(5)$. (1 point)
- Find the total distance traveled from $t = 0$ to $t = 5$. (2 points)

Question 3: Area between curves (2 points)



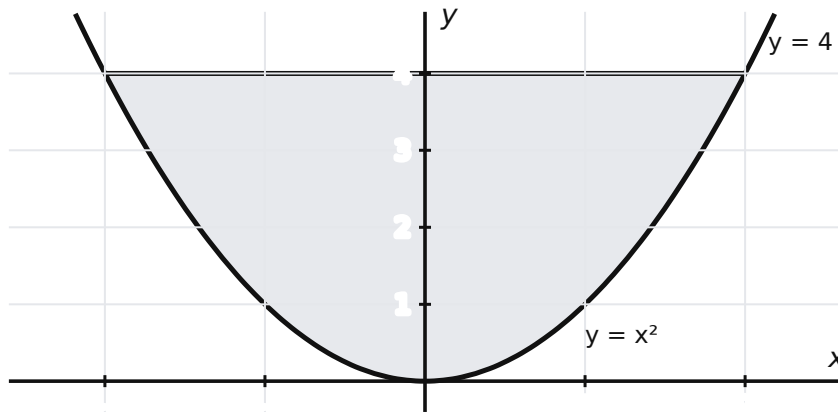
The region between the curves.

Find the area of the region bounded by $y = 6x - x^2$ and $y = x^2$, shown above.

Question 4: Area using y (2 points)

Find the area of the region bounded by $x = y^2$ and $x = 6 - y$.

Question 5: Semicircle cross sections (3 points)

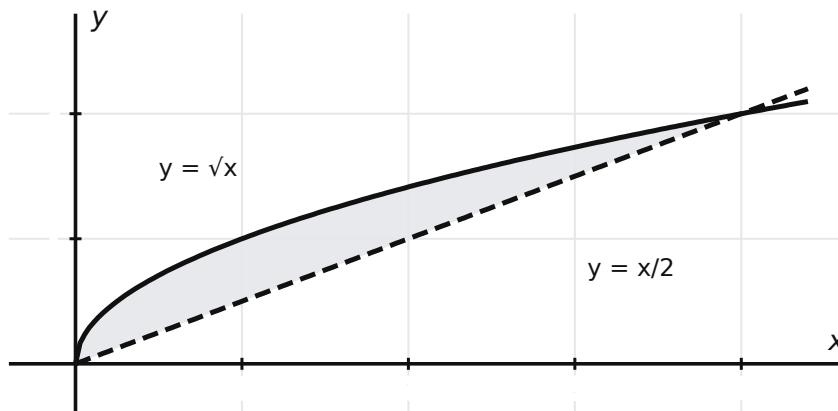


The base of the solid.

The base of a solid is the region between $y = x^2$ and $y = 4$. Cross sections perpendicular to the x -axis are semicircles whose diameters lie in the base. Find the volume.

AP Calculus Applications Integration Test: questions 6-8

Question 6: Washer method (3 points)



The region to revolve about the x -axis.

The region bounded by $y = \sqrt{x}$ and $y = \frac{x}{2}$ is revolved about the x -axis. Find the volume of the solid.

Question 7: Rates of change (3 points)

The number of people $A(t)$ in a stadium, in hundreds, changes at the rate $(2+t) - (8-t)$, where $2+t$ is the rate in and $8-t$ is the rate out, in hundreds per hour, for $0 \leq t \leq 8$. At $t = 0$, $A = 50$.

- Find $A(6)$. (1 point)
- At what time is A least? Justify. (1 point)

c. Find the least value of A . (1 point)

Question 8: Area with three intersections (2 points)

Find the total area of the regions enclosed by $y = x^3 - 9x$ and the x -axis.

How to use this ap calculus applications integration test

Take this ap calculus applications integration test without notes, then grade it with the test answer key out of 20 points.

