

AP Calculus AB - Average Value, Area and Volume - Test

Common Core AP CALC AB 8.1, AP CALC AB 8.2, AP CALC AB 8.3, AP CALC AB 8.4, AP CALC AB 8.5, AP CALC AB 8.6, AP CALC AB 8.7, AP CALC AB 8.8, AP CALC AB 8.9, AP CALC AB 8.10, AP CALC AB 8.11, AP CALC AB 8.12 · maths-pdf.fr/en/

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

This test checks average value, motion with integrals, area between curves, volumes with cross sections and discs and washers (AP Calculus AB, 8.1 to 8.12). 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: Average Value, Area and Volume
- Standards: AP CALC AB 8.1, AP CALC AB 8.2, AP CALC AB 8.3, AP CALC AB 8.4, AP CALC AB 8.5, AP CALC AB 8.6, AP CALC AB 8.7, AP CALC AB 8.8, AP CALC AB 8.9, AP CALC AB 8.10, AP CALC AB 8.11, AP CALC AB 8.12
- Time: 45 minutes
- Total: 20 points

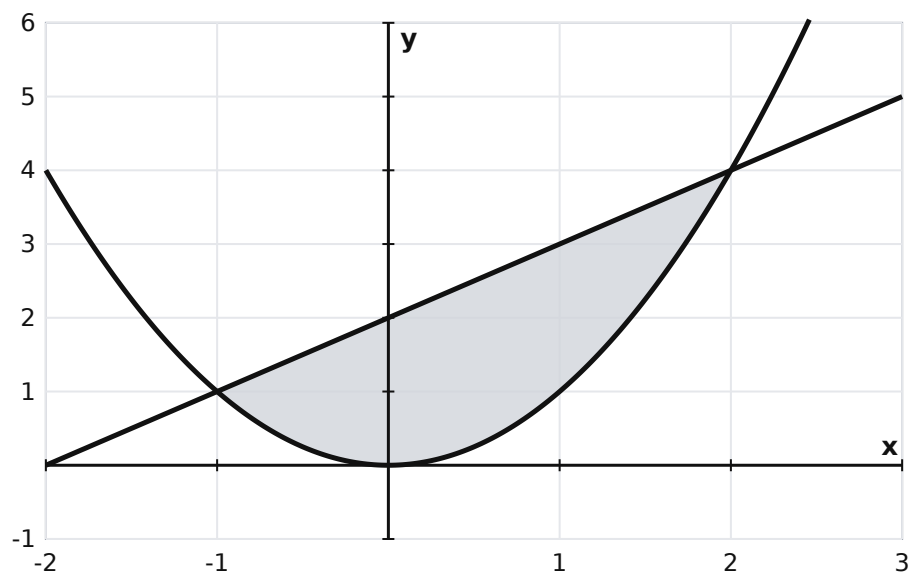
Question 1 - Average value [2 pts]

Find the average value of $f(x) = e^{2x}$ on $[0, \ln 3]$.

Question 2 - Motion [2 pts]

A bike has velocity $v(t) = 6 - 2t$ m/s for $0 \leq t \leq 5$. Find the displacement and the total distance.

Question 3 - Area between curves [3 pts]



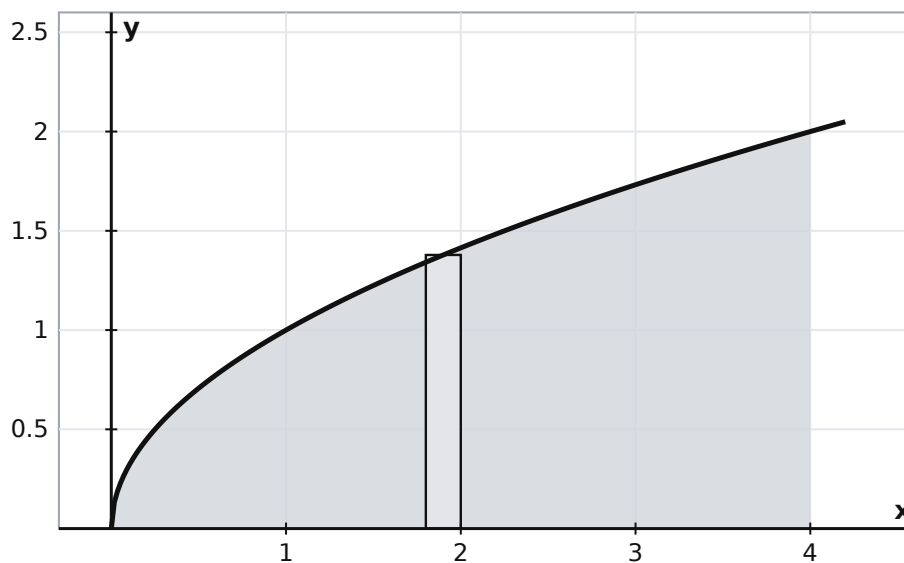
The region between $y = x + 2$ and $y = x^2$.

Find the area of the region between $y = x + 2$ and $y = x^2$.

Question 4 - Area with a crossing [3 pts]

Find the total area between $y = \sin x$ and $y = \cos x$ for $0 \leq x \leq \pi$.

Question 5 - Cross sections [3 pts]

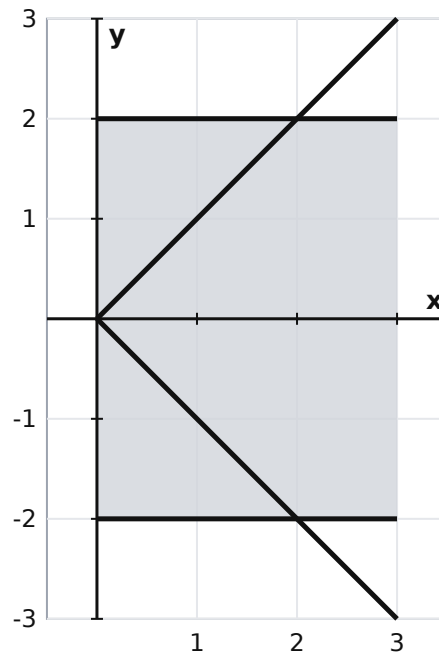


Base region under $y = \sqrt{x}$.

The base of a solid is the region under $y = \sqrt{x}$ on $[0, 4]$. Cross sections perpendicular to the x -

axis are equilateral triangles with a side in the base. Find the volume.

Question 6 - Washer method [3 pts]



Outer radius 2 and inner radius x .

The region bounded by $y=2$, $y=x$ and the y -axis is revolved about the x -axis. Find the volume.

Question 7 - Average rate in context [2 pts]

A traffic sensor reports cars per minute as $r(t) = 20 + 12\sin\frac{\pi t}{30}$ for $0 \leq t \leq 30$ minutes. Find the average rate and the total number of cars.

Question 8 - Volume of a solid of revolution [2 pts]

Find the volume when the region under $y=e^x$ on $[0,1]$ is revolved about the x -axis.