

AP CALCULUS AB
Unit 6
Exam – Sample

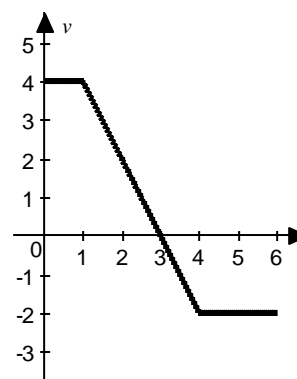
Name _____
Date _____
Period _____

No calculators may be used on this portion of the test.

1. The base of a solid is the region bounded by the curves $y = \ln x$, $x = 2$, and the x -axis. The cross sections perpendicular to the x -axis are semicircles with diameters running from the x -axis to the curve. Set up an integral expression to find the volume of the solid. **Do not solve.**

2. Set up an integral expression to find the area bounded by the curves $x = 6y + 9$ and $x = 3y^2$.
Do not solve.

3. The graph of the velocity function of a particle moving along a linear path is given to the right, where velocity is measured in m/s. Determine the average velocity of the particle over the interval $[1, 6]$.



4. Find the general solution for each of the following differential equations.

a. $\frac{dy}{dx} = \frac{\cos(2x)}{y^4}$

b. $x^2 y^2 + y' = 4y^2$

5. Find the particular solution for each of the following differential equations with given initial conditions.

a. $\csc \theta \frac{dr}{d\theta} = 2\sqrt{r}; r(\pi) = 16$

b. $\frac{y'}{2x-1} = y+4; y(1) = -1$

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6. Find the area of the region bounded by the curves $h(x) = 5 - x^2$ and $r(x) = x^3 + 2x^2 - 2x + 2$.

7. A region is bounded by the curves $y = 6 - e^x$, $y = 1$, and $x = 0$. Find the volume generated by revolving the region about the y -axis.

8. Consider the region bounded by the curves $f(x) = x^2 - x$ and $g(x) = \sin(x^2)$. Find the volume generated by revolving the region about the line $y = -3$.

9. The population of Kennesaw, Georgia was 11,500 in the year 1995, and 30,000 in the year 2005. If the population growth is proportional to the population, find an equation that represents the population at time t and use it to predict the population in 2015. **Round your final answer to the nearest whole number.**
10. On a hot summer day, a bottle of water has been left outside in the heat. The temperature of the water is determined to be 90°F . The bottle of water is placed in a refrigerator set to 35°F . In 60 minutes, the water has cooled to 73°F . How long will it take for the temperature of the water to reach 40°F ? (Hint: Use Newton's Law of Cooling.)