

CALCULUS -- Worksheet #67

1996 Free Response (3)

The rate of consumption of cola in the United States is given by $S(t) = Ce^{kt}$, where S is measured in billions of gallons per year and t is measured in years from the beginning of 1980.

- (a) The consumption rate doubles every 5 years and the consumption rate at the beginning of 1980 was 6 billion gallons per year. Find C and k .
- (b) Find the average rate of consumption of cola over the 10-year time period beginning January 1, 1983. Indicate units of measure.

- (c) Use the trapezoidal rule with four equal subdivisions to estimate $\int_5^7 S(t) dt$.

- (d) Using correct units, explain the meaning of $\int_5^7 S(t) dt$ in terms of cola consumption.
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1. If $\frac{dy}{dx} = \frac{y}{2\sqrt{x}}$ and $y = 1$ when $x = 4$, then

A) $y^2 = 4\sqrt{x} - 7$ B) $\ln y = 4\sqrt{x} - 8$ C) $\ln y = \sqrt{x-2}$ D) $y = e^{\sqrt{x}}$ E) $y = e^{\sqrt{x}-2}$

2. If $\frac{dy}{dx} = e^y$ and $y = 0$ when $x = 1$, then

A) $y = \ln|x|$ B) $y = \ln|2-x|$ C) $e^{-y} = 2 - x$ D) $y = -\ln|x|$ E) $e^{-y} = x - 2$

3. $\int_0^{\frac{\pi}{6}} \frac{\cos q}{1+2\sin q} dq =$ A) $\ln 2$ B) $\frac{3}{8}$ C) $-\frac{1}{2} \ln 2$ D) $\frac{3}{2}$ E) $\ln\sqrt{2}$

4. $\int_{\frac{\pi}{12}}^{\frac{\pi}{4}} \frac{\cos 2x}{\sin^2 2x} dx =$ A) $-\frac{1}{4}$ B) 1 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) -1
