

CALCULUS -- Worksheet #68

1997 Free Response (1 and 2)

1. The area bounded by the curve $x = 3y - y^2$ and the line $x = -y$ is represented by

- A) $\int_0^4 (2y - y^2) dy$ B) $\int_0^4 (4y - y^2) dy$ C) $\int_0^3 (3y - y^2) dy + \int_0^4 y dy$
 D) $\int_0^3 (y^2 - 4y) dy$ E) $\int_0^3 (2y - y^2) dy$

2. The region bounded by $y = e^x$, $y = 1$, and $x = 2$ is rotated about the x -axis. The volume of the solid generated is given by the integral:

- A) $\pi \int_0^2 e^{2x} dx$ B) $2\pi \int_1^{e^2} (2 - \ln y)(y - 1) dy$ C) $\pi \int_0^2 (e^{2x} - 1) dx$
 D) $2\pi \int_0^{e^2} y(2 - \ln y) dy$ E) $\pi \int_0^2 (e^x - 1)^2 dx$

3. A particle moves on a straight line so that its velocity at time t is given by $v = 4s$, where s is its distance from the origin. If $s = 3$ when $t = 0$, then, when $t = \frac{1}{2}$, s equals

- A) $1 + e^2$ B) $2e^3$ C) e^2 D) $2 + e^2$ E) $3e^2$

4. Bacteria in a culture increase at a rate proportional to the number present. An initial population of 200 triples in 10 hours. If this pattern of increase continues unabated, then the approximate number of bacteria after one full day is: A) 1160 B) 1440 C) 2408 D) 2793 E) 8380

5. Using the substitution $x = 2t - 1$, the definite integral $\int_3^5 t\sqrt{2t - 1} dt$ may be expressed in the form

$k \int_a^b (x + 1)\sqrt{x} dx$, where $\{k, a, b\} =$

- A) $\left\{\frac{1}{4}, 2, 3\right\}$ B) $\left\{\frac{1}{4}, 3, 5\right\}$ C) $\left\{\frac{1}{4}, 5, 9\right\}$ D) $\left\{\frac{1}{2}, 2, 3\right\}$ E) $\left\{\frac{1}{2}, 5, 9\right\}$

6. The curve defined by $x^3 + xy - y^2 = 10$ has a vertical tangent line when $x =$

- A) 0 or $-\frac{1}{3}$ B) 1.037 C) 2.074 D) 2.096 E) 2.154