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Math 213, Midterm Exam No. 1, Oct. 16, 2003
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NAME:

Please show details of your work

1. (10 points). The rate of change of sales of a new brand of tomato soup (in thousands per month) is given by

$$S(x) = \sqrt{x} + 2$$

where x is the time in months that the new product has been on the market. Find the total sales after 9 months.

2. (40 points) Find

$$\int x^2 e^{-x^3}\,dx\,, \quad \int_1^2 x^2 \ln 5x\,dx\,, \quad \int_2^\infty \frac{\ln x}{x^3}\,dx\,, \quad \int_0^1 \frac{x^5\,dx}{\sqrt{3+x^3}}\,,$$

$$\int_0^\infty \frac{dx}{(2x+1)^5}\,,$$

3. (20 points) Find the volume of a solid formed by rotating around the x-axis a function which is a circle given by

$$x^2 + y^2 = 4$$

in the first quadrant **and** a parabola

$$y = -x^2 + 2$$

for x between $-\sqrt{2}$ and 0.

4. (15 points) Find the area between the graph of the function

$$y = \frac{3}{(x+2)^2}$$

and the function $y = -3$ for $x \in [0, 1]$.

5. (15 points) A particle is moving along a straight line with accelaration $a(t) = t^2 - 2t$. Its distance from the starting point after 3 seconds is 8 cm. Its initial velocity at $t = 0$ is 1cm per second.

   1) Find $v(t)$, velocity of the particle at time t.

   2) Find $s(t)$, the distance of the particle from the starting point after t seconds. Also find the distance it has travelled after 10 seconds.