1983 - AB1

1. Let f be the function defined by $f(x) = -2 + \ln(x^2)$.

   (a) For what real numbers x is f defined?
   (b) Find the zeros of f.
   (c) Write an equation for the line tangent to the graph of f at $x = 1$.

1983 - AB2

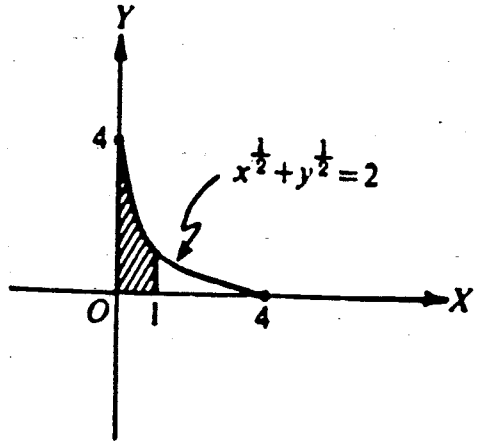
2. A particle moves along the X-axis so that at time t its position is given by $x(t) = t^3 - 6t^2 + 9t + 11$.

   (a) What is the velocity of the particle at $t = 0$?
   (b) During what time intervals is the particle moving to the left?
   (c) What is the total distance traveled by the particle from $t = 0$ to $t = 2$?

1983 - AB3, BC1

3. Let f be the function defined for $\frac{\pi}{6} \leq x \leq \frac{5\pi}{6}$ by $f(x) = x + \sin^2 x$.

   (a) Find all values of x for which $f'(x) = 1$.
   (b) Find the x-coordinates of <u>all</u> minimum points of f. Justify your answer.
   (c) Find the x-coordinates of <u>all</u> inflection points of f. Justify your answer.



1983 - AB 4

The figure above shows the graph of the equation $x^{\frac{1}{2}} + y^{\frac{1}{2}} = 2$. Let R be the shaded region between the graph of $x^{\frac{1}{2}} + y^{\frac{1}{2}} = 2$ and the X-axis from $x = 0$ to $x = 1$.

(a) Find the area of R by setting up and integrating a definite integral.

(b) Set up, but do not integrate, an integral expression in terms of a single variable for the volume of the solid formed by revolving the region R about the X-axis.

(c) Set up, but do not integrate, an integral expression in terms of a single variable for the volume of the solid formed by revolving the region R about the line $x = 1$.

1983 - AB 5, BC 3

5. At time $t = 0$, a jogger is running at a velocity of 300 meters per minute. The jogger is slowing down with a negative acceleration that is directly proportional to time t. This brings the jogger to a stop in 10 minutes.

(a) Write an expression for the velocity of the jogger at time t.

(b) What is the total distance traveled by the jogger in that 10-minute interval?