Name : ID #......Serial #:

Question 1: Find the function f(t) that satisfies

$$f''(t) = -12\sin(2t) - 4e^{2t}, \quad f(0) = 0, \quad f'(0) = -1.$$

Question 2: A farmer has 2400 ft of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fence along the river. What are the dimensions of the field that has the largest area?

Question 3: Evaluate the following integrals:

- $\int (\tan^2 x 4 \csc x \cot x) dx =$
- $\bullet \int_0^\pi \cos^2 x \ dx =$
- $\int_0^1 x \sqrt{1+3x} \ dx =$
- $\bullet \int x \ln x \ dx =$

Question 4: A circle has a radius of 10 meters, that is measured with an error of 2%. Use differentials to estimate the error in calculating its area.

Question 5: Find

- the area between $y = 1 x^2$ and the x-axis.
- the area between y = 2 and $y = \sin x$, from x = 0 to $x = \pi$.