MATH 1101Y 2009 Quiz 9 (b)

1. (3 pts) Find an expression for the area under the graph of $f = \ln x, 1 \leq x \leq 5$ as a limit. Do not evaluate the limit.

   Solution:

$$A = \lim_{n\to\infty} \sum_{i=1}^{n} \ln\left(1 + \frac{4i}{n}\right) \cdot \frac{4}{n}$$

   or

$$A = \lim_{n\to\infty} \sum_{i=0}^{n-1} \ln\left(1 + \frac{4i}{n}\right) \cdot \frac{4}{n}$$

□

2. (2 pts) Find the derivative of the function

$$g(x) = \int_{\sqrt{x}}^{x^2} \sin\left(t^2\right) dt.$$

   Solution: Since

$$g(x) = \int_{1}^{x^2} \sin\left(t^2\right) dt - \int_{1}^{\sqrt{x}} \sin\left(t^2\right) dt$$

$$g'(x) = \sin\left(x^4\right) \cdot 2x - \sin x \cdot \left(\frac{1}{2\sqrt{x}}\right).$$

□