MATH 1B PRACTICE MIDTERM # 1

Problem 1. Evaluate the following (indefinite) integrals:

$$a) \int (x^{1/3} + x^{1/4})^{-1} dx$$

$$b) \int \frac{2x}{(1 + x + x^2)} dx$$

Problem 2. Evaluate the following (definite) integrals:

$$a) \int_1^{e^\pi} \cos(\ln x) dx$$

$$b) \int_0^\infty e^{-x}(1 - e^{-2x})^{1/2} dx$$

Problem 3. a) Suppose that $f(x)$ is a function defined on $[a, b]$. State the formula for the length of the curve defined by the graph of $f(x)$.

b) Find that length in the case when $f(x) = \ln x$, $a = 1$, and $b = \sqrt{3}$.

Problem 4. Determine (providing an explanation) convergence or divergence of the following series:

$$a) \sum_{n=1}^\infty \frac{\ln n}{n}$$

$$b) \sum_{n=1}^\infty \sin(1/n)$$

$$c) \sum_{n=2}^\infty (\ln n)^{-n}$$

Problem 5. Estimate the error in approximating the following series by the sum of its first 10 terms:

$$a) \sum_{n=1}^\infty \frac{1 + \cos n}{n^5}$$

$$b) \sum_{n=1}^\infty \frac{(-1)^n}{\ln n}$$