Kuwait University | Math 102 | May 13, 1999

Dept. of Math. and Comp. Sc. | Second Examination | Duration: 75 minutes

Calculators and mobile phones are not allowed.

Answer all of the following questions.

1. Evaluate the following integrals

(a) $\int e^{-2x}\sin x\,dx$,

(b) $\int \frac{\cos^3 x}{\sqrt{\sin x}}\,dx$,

(c) $\int \frac{dx}{\sqrt{2x-x^2}}$,

(d) $\int \frac{dx}{\sin x - \cos x + 1}$

7 points each

2. Determine whether the improper integral

$$\int_0^1 \ln(x^x)\,dx$$

is convergent or divergent and if convergent find its value.

7 points

3. Find the arc length of the parametric curve

$$x = t+2,\ y = \cosh t, \qquad \ln 2 \le t \le \ln 3.$$

7 points

4. Sketch the polar curves $r = 3\cos\theta$ and $r = 2 - \cos\theta$ and find the area that is inside the graph of $r = 3\cos\theta$ and outside the graph of $r = 2 - \cos\theta$.

8 points