Kuwait University   MATH 102   December 1, 1998

Math. Dept.   Second Incomplete Exam   Duration 75 minutes

Answer the following questions. Calculators and mobile telephones are not allowed.

Evaluate the following integrals:

1. $\displaystyle\int \frac{dx}{\tan x + \sin x}$ (6 points)

2. $\displaystyle\int \sqrt{\cot x}\, \csc^6 x\, dx$ (6 points)

3. $\displaystyle\int \frac{x}{\sqrt{x^2 + 2x}}\, dx$ (6 points)

4. $\displaystyle\int \sin^{-1}\sqrt{x}\, dx$ (7 points)

5. $\displaystyle\int \frac{x^2 - 2x + 1}{x^4 + 2x^2 + 1}\, dx$ (7 points)

Determine whether the integral converges or diverges, and if it converges, find its value.

6. $\displaystyle\int_0^\infty \frac{(\tan^{-1} x)^2}{1 + x^2}\, dx$ (6 points)

Evaluate the following limits.   (6 points each)

7. $\displaystyle\lim_{x \to \infty} (1 - e^x)^{e^{-x}}$ 8. $\displaystyle\lim_{x \to 0+} \coth x - \cot x$