Kuwait University
Department of Mathematics & Computer Science

Math 102 — July 31, 2003
Calculus II — Second Midterm Examination — Time: 90 minutes

Use of calculators, mobile phones or pagers is not allowed during the exam.

1. Evaluate the following integrals: [3 pts each]

a. $\int 3^x \tan^{-1} 3^x \, dx$

b. $\int \tan^3 x \sec^{-3/2} x \, dx$

c. $\int \frac{x^2}{\sqrt{1-4x^2}} \, dx$

d. $\int \frac{4x}{x^3+3x^2+3x+9} \, dx$

e. $\int \frac{\sqrt{x}}{1-\sqrt{1-\sqrt{x}}} \, dx$

f. $\int_0^\infty \frac{1}{e^x+e^{-x}} \, dx$ (if convergent)

2. The curve C is parametrically defined by:

$$x = e^{-2t}\cos t; \quad y = e^{-2t}\sin t, \qquad 0 \le t \le \pi$$

a. Find the arc length of C. [4 pts]

b. Find $\frac{d^2y}{dx^2}$. [3 pts]