Department of Mathematics
Kuwait University
Math-102

Date: 05/07/2007
Duration : 75 minutes

First Midterm

Calculators are not allowed. Please turn off your mobile and pager.

1. (2 points) Find $\frac{dy}{dx}$ if $y = \dfrac{(\tanh x)^{\tan x} \quad 3^{\ln(\sin^{-1} x)}}{e^{\sec(x^3)} \quad \sqrt{2-x^3}}$

2. (5 points)

(a) Show that $\cos^{-1}(\dfrac{x-1}{x+1}) = 2\cot^{-1}(\sqrt{x}) - \dfrac{\pi}{2}$.

(b) Solve, for x, the equation $\coth(\ln x) = 3$.

3. (3 points each) Evaluate the following integrals

(a) $\displaystyle\int \frac{e^x}{3+e^{x+2}}dx$

(b) $\displaystyle\int_1^e \frac{1}{x(1+\ln(\sqrt{x}))^{\frac{1}{3}}}dx$

(c) $\displaystyle\int \frac{\sin x}{\sqrt{1+\sin^2 x}}dx$

(d) $\displaystyle\int \frac{5}{\tanh x\sqrt{\cosh^2 x - 5}}dx$

4. (2 points each) Let $f(x) = \cos^{-1}(4^{-x} - 3) + \frac{\pi}{2}$.

(a) Find the domain and the range of f.

(b) Show that f has an inverse function.

(c) Find $f^{-1}(x)$.