UNIVERSITY OF KUWAIT
DEPARTMENT OF MATHS
SECOND SEMESTER 87/88

MATH 102
1ST MID-TERM
TIME : 90 MIN

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Q1:(a) Find the area under the graph of $f(x) = 3^x$ between $x = 0$ and $x = 1$.

(b) Find the volume of the solid generated by rotating the region bounded by

$g(x) = \dfrac{1}{\sqrt{1 + x^2}}$ and the x-axis from $x = 0$ to $x = 1$ about the x-axis .

12 MARKS

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Q2:(a) Find the arc-length of the graph of the function $f(x) = \ln(\cos x)$
from $x = 0$ to $x = \dfrac{\pi}{4}$.

(b) Find the integral $\displaystyle\int (\cos x)\, e^{\ln(2 - \sin^2 x)}\, dx$

12 MARKS

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Q3: Evaluate the following integrals

(a) $\displaystyle\int_{0}^{\pi/6} \dfrac{dx}{\sqrt{1 - \tan^2 x}}$

(b) $\displaystyle\int (\tan x + 1)^2\, dx$

12 MARKS

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Q4: Let $f(x) = \ln(1+x) - (x - \dfrac{x^2}{2})$, $x \geq 0$ .Find the intervals where the

function is incraesing. Deduce that $\ln(1+x) > x - \dfrac{x^2}{2}$, for every $x > 0$.

12 MARKS

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Q5: Evaluate the following limits

(a) $\displaystyle\lim_{x \to \infty} \left(x \sin \dfrac{1}{x} + e^{-x} \right)$

(b) $\displaystyle\lim_{x \to e} \dfrac{\ln(\ln x)}{x - e}$

12 MARKS

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OUR BEST WISHES