King Khalid University

College of Science ✥

Department of Mathematics

جامعة الملك خالد ✥

كلية العلـوم ✥

قسم الرياضيات

KING KHALID UNIVERSITY

FINAL EXAM, Semester 2, 1438-1439 h

Math 219 — Calculus II

Time allowed: 2 hours,   Max marks: 50

إبدأ كل سؤال في صفحة جديدة.

➤ **Question 1.** ($5 \times 2 + 3 = 13$ marks)

1. Find the derivative

   (a) $y = \ln(\cos x)$,   (b) $y = \sin^{-1}(e^x)$,   (c) $y = \sec^{-1}(x^2)$,   (d) $y = \log_{10}(\sinh x)$,
   (e) $y = 3^{\tan^2 x}$.

2. Use logarithmic differentiation to find the derivative of $y = (1 + x^2)^x$.

مسبقة بالتفاضل اللوغاريتمي

➤ **Question 2.** ($6 \times 3 = 18$ marks)

التعويض

1. Use substitution rule to evaluate

   (a) $I_1 = \int \dfrac{e^{\sqrt{x}}}{\sqrt{x}}\, dx$,   (b) $I_2 = \int \dfrac{\cos x\, \sin x}{9 + \cos^2 x}\, dx$.

   بالتجزئة

2. Use integration by parts to evaluate

   (a) $I_3 = \int x \cdot e^{3x}\, dx$,   (b) $I_4 = \int \tan^{-1}(3x)\, dx$.

   احسب التكامل المثلثية

3. Evaluate the trigonometric integrals

   (a) $I_5 = \int \sin^2(x)\, dx$,   (b) $I_6 = \int \tan^4 x\, dx$.

➤ **Question 3.** ($4 \times 3 = 12$ marks)

التعويض

1. Use trigonometric substitutions to evaluate

   (a) $I_7 = \int \dfrac{x^3}{\sqrt{9 - x^2}}\, dx$ (☞ set $x = 3\sin\theta$),   (b) $I_8 = \int \dfrac{1}{x^2\, \sqrt{x^2 - 1}}\, dx$ (☞ set $x = \sec\theta$).

   مكسور الجزئي

2. Use partial fraction decomposition to evaluate $I_9 = \int \dfrac{4x^2 + 1}{x(2x - 1)^2}\, dx$.

➤ **Question 4.** ($3 + 4 = 7$ marks)

1. The region bounded by the graph of $y = \dfrac{2}{\sqrt{x}}$, the x–axis and the lines $x = 1$, $x = 4$ is revolved about the x–axis. Find the volume of the resulting solid.

2. Find the arc length of the curve $y = \ln(\sec x)$ from $A(0, 0)$ to $B\!\left(\dfrac{\pi}{4},\ \ln(\sqrt{2})\right)$, ☞ $\left[\sec(\dfrac{\pi}{4}) = \sqrt{2},\ \tan(\dfrac{\pi}{4}) = 1\right]$.

مع تمنياتنا بالنجاح، أسرة ريض ٢١٩.