AOU
الجامعة العربية المفتوحة
Arab Open University
Faculty of Computer Studies

MST129
Applied calculus

Final Examination
Fall Semester 2024/2025

Date: 8/Jan./2025

Number of Exam Pages: 2 (including this cover sheet)	**Time Allowed: 2:00 Hours**

Instructions:

- Total Marks: 50
- This exam consists of **two** parts.
- **ALL questions** must be answered in the External Answer booklet.
- Be sure you write your **name and ID** on the External Answer booklet.
- **Scientific Calculators** are allowed.

Q–1: [5×2 marks] Choose the correct answer:

1.1: the derivative of $y = e^{3-2x} + \sin 2x$ is:

a) $-2e^{3-x} + 2\cos 2x$
b) $2e^{3-x} - 2\cos 2x$
c) $-2\,e^{3-x} - 2\sin x$
d) None of the above

1.2: the derivative of $x \ln 3x$ *is*:

a) $ln3x+1$
b) Ln3x+3
c) $\ln 27x^2$
d) None of the above

1.3: $\int \cos 4x\, dx$

a) $4sin4x + c$
b) $\sin 4x/4 + c$
c) $-\sin 4x + c$
d) None of the above

1.4: The value of $\int_2^4 \frac{1}{x^2}$ dx is:

a) $\frac{1}{4}$
b) $\frac{-3}{4}$
c) $\frac{-1}{4}$
d) None of the above

1.5: If $y = \ln \sin x$, then $\frac{dy}{dx} =$

a) $(\ln \sin x).\cos(x)$
b) $\tan(x)$
c) $\mathrm{Cot}(x)$
d) None of the above

Each question is worth 10 marks. Answer the following questions:

Q–2:

a) **[6 marks]** Let $f(x) = 3x^4 - 4x^3 + 6$, $-4 \le x \le 2$
Find the absolute maximum and absolute minimum.

b) **[4marks]** Use implicit differentiation of the equation $x^3 + y^3 = 6xy$ *to* find the slope of the graph at the designated point; $P(3,3)$.

Q–3:

a) **[5 marks]** Find the equation of the tangent line to the curve $f(x)=\sqrt{1 + 4\sin x}$ at the point (0,1)

b) **[5 marks]** use logarithmic differentiation to find the derivative of the function $y=\sqrt[4]{\frac{x^2+1}{x^2-1}}$

Q–4:

a) **[2×3 marks]** Evaluate the following integrals:

$\int_1^4 5 - 2x + 3x^2\, dx.$

i. $\int_0^{\pi} 2sinx\, dx.$

b) **[4marks]** Use integration by substitution to evaluate $\int \frac{e^x}{e^x+1}$ dx

Q–5:

a) **[5 marks]** Find the area of the region bounded by the graphs of $y=9-x^2$ *and* $y = x + 1$ from x=-1 to x=2

b) **[5 marks]** Use integration by parts to evaluate $\int \ln x$ dx

End of questions