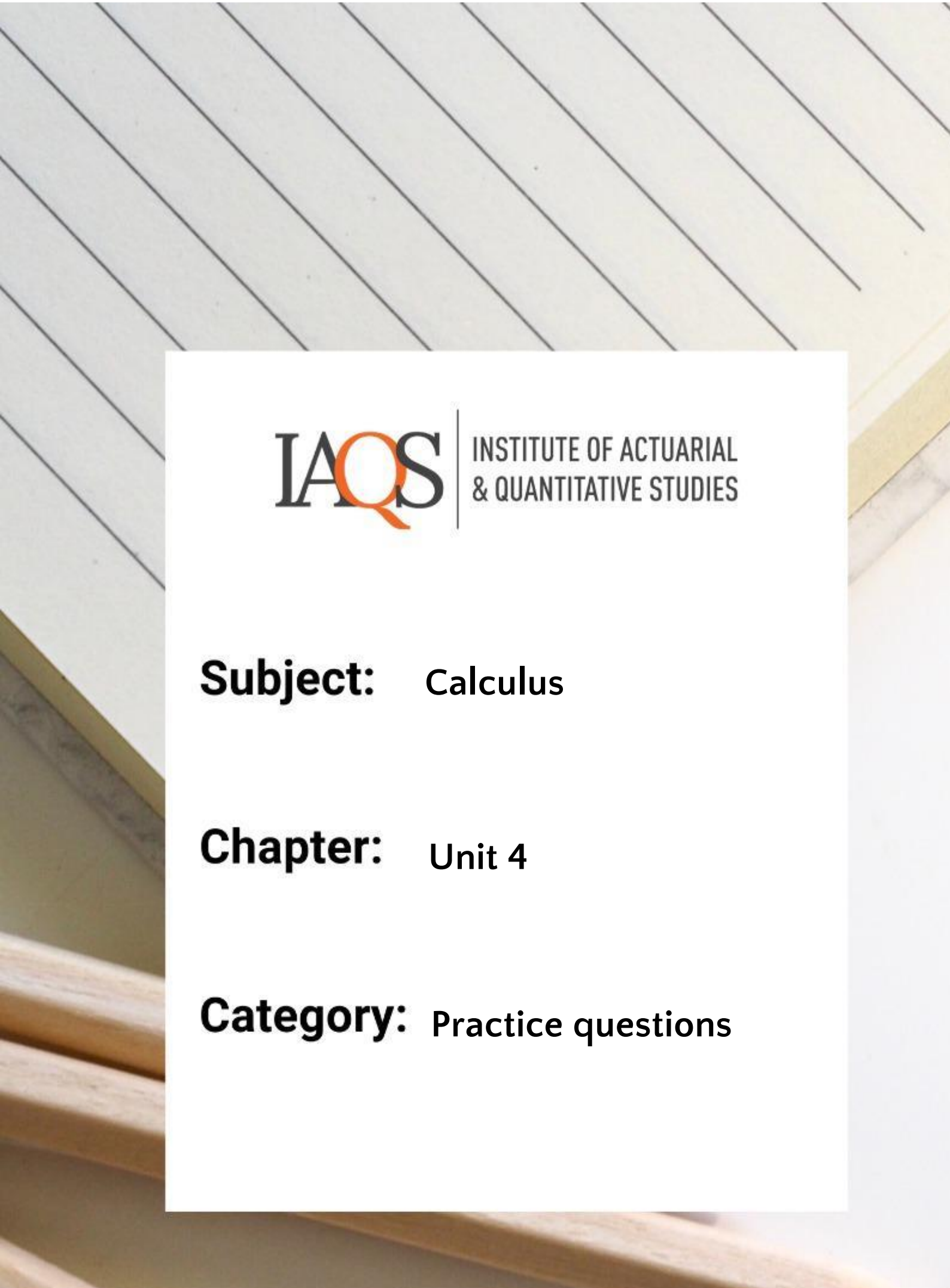

INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Subject: Calculus

Chapter: Unit 4

Category: Practice questions

1. Determine the order of the differential equation.

a) $y' + y = 3y^2$

b) $y''' + y'' y' = 3x^2$

2. Solve the ordinary differential equation (ODE) $\frac{dx}{dt} = 5x - 3$ for x(t)

3. Solve the ODE with initial condition:

$\frac{dy}{dx} = 7y^2x^3$ y(2) = 3

4. Which of the following equations is a second-order, linear ODE:

(a) $\frac{dy}{dt} = y + 1$

(b) $\frac{d^2y}{dt^2} + y\frac{dy}{dt} + y = 1$

(c) $\frac{d^2y}{dt^2} + t^3y = 0$

(d) $\frac{d^3y}{dt^3} + y\frac{dy}{dt} = 1$

5. Find the Taylor Series for f(x) = e^{-6x} about x = - 4

6. Find the Taylor Series for f(x) = $\frac{7}{x^4}$ about x = -3

7. Find the Taylor Series for f(x) = $7x^2 - 6x + 1$ about x = 2

8. Find the Maclaurin series for e^{kx}, where k is a real number.

9. Find the Maclaurin series for $(1 + x)^{\mu}$.

10. The necessary condition for the Maclaurin expansion to be true for function f(x) is

A. F(x) should be continuous
B. F(x) should be differentiable
C. F(x) should exists at every point
D. F(x) should be continuous and differentiable