



Instructions: Calculators are **not** allowed.

Question 1 (2+1 Marks):

1. Use Riemann sum to evaluate the definite integral $\int_0^1 x^3 dx$.
2. If $F(x) = \int_{\sqrt{3x^2+4}}^{\sec(x^3)} \sqrt{4+t^2} dt$, find $F'(x)$.

Question 2 (1+1 Marks): Find $\frac{dy}{dx}$ if

1. $y(x) = \left(\sec^{-1}(\ln x) + e^{x^4} \right)^5$.
2. $y(x) = (\tan x)^x$.

Question 3: Evaluate the following integrals (1+1+1+1+1+1+2+2 Marks)

1. $\int (x^3 + 1) \sec(x^4 + 4x) dx$.
2. $\int \frac{x^5 + x}{\sqrt{x^6 + 3x^2 + 8}} dx$.
3. $\int \frac{1}{\operatorname{csch} x (1 + \cosh x)} dx$.
4. $\int \frac{5^{\tanh x}}{\cosh^2 x} dx$.
5. $\int \frac{2^x}{\sqrt{9 - 4^x}} dx$.
6. $\int \frac{(e^x - 1) \cos(x + e^{-x})}{e^x} dx$.
7. $\int_0^1 \frac{x}{x+1} dx$.
8. $\int \frac{1}{x^2 + 8x + 25} dx$.