

**Question 1(2+3+3)**

a) Find the value of the constant  $c$  such that

$$\sum_{k=1}^{10} (k^2 + 3c) = 445$$

b) Evaluate the indefinite integral  $\int x^3 \cos x^4 (\sin x^4 + 1)^5 dx$

c) Find the values of  $z$  that satisfy the mean value theorem for the function  $f(x) = 3x^2 + 1$  on  $[0, 2]$ .

**Question 2(3+2)**

a) Approximate the integral  $\int_0^2 \frac{dx}{1+x^4}$  using Simpson's rule with  $n=4$

b) If  $f(x) = \sqrt{\ln x} + \log_2(\tan^{-1} x)$ ,  $x > 1$  find  $f'(x)$ .

**Question 3(3+3)**

a) Find  $y'$  if  $y = x^{\cosh x}$ ,  $x > 0$

b) Evaluate the integral  $\int 2^x 3^{2^x} dx$

**Question 4(3+3)**

a) Compute the integral  $\int \frac{2dx}{\sqrt{3+4x^2}}$

b) Evaluate  $\int \frac{dx}{x\sqrt{x^3-8}}$ ,  $x > 2$

