



Q1) A) Use the chain rule to find the derivative of  $(w=xy)$  with respect to  $(t)$  along the path  $x=\cos t$ ,  $y=\sin t$ . What is the derivative value at  $(\frac{\pi}{2})$  (10 marks)

B) If  $z = f\left(\frac{y}{x}\right)$  then show that  $\left(\frac{x}{y}\right) \frac{\partial z}{\partial x} = - \frac{\partial z}{\partial y}$  (15 marks)

Q2) Find the following integral  $(\int_0^4 \int_{\sqrt{x}}^{6-x} dy dx)$  by changing the order of the integration. (25 marks)

Q3) Solve the following differential equation:  $(5y^4x^3 - 2y^7)dy - (x^7 - 3x^2y^5)dx = 0$  (25 marks)

Q4) Show the following sequences are convergence or divergence (Answer five only):

1-  $a_n = \frac{n^n}{(n+1)^{n+1}}$

2-  $a_n = \tanh n$

3-  $a_n = \frac{2(n+1)+1}{2n+1}$

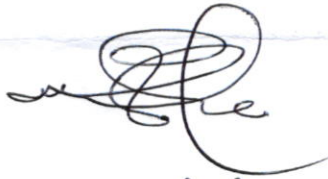
4-  $a_n = \frac{\ln(3n+5)}{n}$

5-  $a_n = \frac{n^2}{2n-1} \sin \frac{1}{n}$

6-  $a_n = \frac{\ln n}{\sqrt[n]{n}}$  (25 marks)

Good luck



  
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