

(1) Test the series: (a) $\sum_{n=1}^{\infty} \frac{\sin n}{n^2}$

(b) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n^2 + 2^n}$

(2) If $u = \sin^{-1}\left(\frac{x+2y}{\sqrt{x}+\sqrt{y}}\right)$. Show that: $xu_x + yu_y = \frac{1}{2} \tan u$

(3) Find the dimensions of a box of maximum volume bounded by $x^2 + 2y^2 + 3z^2 = 27$

(4) Solve the equations: (a) $y' = \frac{4y+x}{4x+y}$

(b) $y' = -\frac{x+4y}{y+4x+1}$

(c) $y'''' + y' = \cos x$

Good Luck

Dr. Mohamed H. Eid