

(10pts) 1. What is the value of the determinant D when

$$D = \begin{vmatrix} 1 & 1 & 1 \\ 2 & -1 & 1 \\ 1 & 2 & -1 \end{vmatrix}$$

(12pts) 2. What is the value of each of the unknowns in the following three equations?

$$\frac{L}{2} + \frac{m}{3} + \frac{n}{4} = 62$$

$$\frac{L}{4} + \frac{m}{5} + \frac{n}{6} = 38$$

$$\frac{L}{3} + \frac{m}{4} + \frac{n}{5} = 47$$

(12pts) 3. If $x = \frac{1}{2} \ln \frac{1+u}{1-u}$ (\ln = natural logarithm), solve for u.

(12pts) 4. Using the binomial expansion to expand $(1 - 2x^{\frac{1}{2}})^{-2}$ to five terms.

(12pts) 5. If $f(x) = x^2 e^{-x}$, determine that $\left(\frac{d^2 f}{dx^2}\right) + \left(\frac{df}{dx}\right) - \left[2 \frac{(1-x)}{x^2}\right] f$.

(14pts) 6. Two ships leave the same port at the same time, one sailing due northeast at a rate of 6 mph and the other sailing due north at the rate of 10 mph. Find the distance between the two ships after 3 hr of sailing.

(14pts) 7. Circular cylindrical cans of volume V_0 are to be manufactured with both ends closed. Determine the ratio between the diameter and height that will require the minimum amount of metal to make each can.

(14pts) 8. Assume a group of 9 people consists of 4 men and 5 women. Compute the probability that a committee of 3, selected at random, would consist of 2 men and 1 woman.

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