PURE MATHEMATICS
UNIT 2 – TEST 3 (PREVIEW)
1 hour 20 minutes

1. A committee of 5 people is to be chosen from 6 men and 4 women. In how many ways can this be done

   (i) if there must be 3 men and 2 women on the committee, [2]

   (ii) if there must be more men than women on the committee, [3]

   (iii) if there must be 3 men and 2 women, and one particular woman refuses to be on the committee with one particular man? [3]

2. Data about employment for males and females in a small rural area are shown in the table.

	Unemployed	Employed
Male	206	412
Female	358	305

   Unemployed Employed Male 206 412 Female 358 305 A person from this area is chosen at random.

   Let M be the event that the person is male and let E be the event that the person is employed.

   (i) Find $P(M)$. [2]

   (ii) Find $P(M \text{ and } E)$. [1]

   (iii) Are M and E independent events? Justify your answer. [3]

   (iv) Given that the person chosen is unemployed, find the probability that the person is female. [2]

3. (a) Find the general solution of the differential equation

$$\frac{dy}{dx} + 2y = x$$

   Given that $y = 1$ at $x = 0$,

   (b) find the exact values of the coordinates of the minimum point of the particular solution curve.

4. It is given that $x \neq 0$ and

$$x\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 4xy = 8x^2 + 16$$

   Show that if $z = xy$ then

$$\frac{d^2z}{dx^2} + 4z = 8x^2 + 16$$

   [3]

   Find y in terms of x, given that $y = 0$ and $\frac{dy}{dx} = -2$ when $x = \frac{1}{2}\pi$. [9]

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5. (a) Evaluate in terms of k, the determinant $\begin{vmatrix} 1 & 1 & -3 \\ 3 & -1 & -1 \\ 5 & -3 & k \end{vmatrix}$

(b) A farmer made three separate visits to the chicken farm to purchase chickens. On each visit he paid $\$x$ for each grade A chicken, $\$y$ for each grade B chicken and $\$z$ for each grade C chicken. His calculations are summarized in the table below.

Number of Visits	Number of Chickens Bought			Total Spent $
	Grade A	Grade B	Grade C	
1	20	40	60	1 120
2	40	60	80	1 720
3	60	80	120	2 480

(i) Use the information above to form a system of linear equations in x, y and z

(ii) Express the system in the form $Ax = b$

(iii) Solve the equations to find x, y and z.

END OF EXAMINATION