NAME: ………………………………………………. CLASS: ……….

MATHEMATICS P425/2 TEST FOR MARCH

TIME: 1 HOUR

Answer **all** the questions.

1. A random variable X is such that X~ $N(56, 289)$. Find $P(42.5 < X \leq 73)$.

2. A continuous random variable X has a probability distribution function given by
$$f(x) = \begin{cases} kx(9 - x^2), & 0 < x < 3 \\ 0 & elsewhere \end{cases}.$$
Find the: (i) value of the constant k (ii) mode.

3. A particle initially at a point with position vector $12\mathbf{i} + 28\mathbf{j} - 15\mathbf{k}\ m$ moves with a constant speed of $6ms^{-1}$ in a direction $2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$. Find its distance from the origin after 4 seconds.

4. Use the trapezium rule with six ordinates to estimate $\int_0^{\pi} e^{-\sin x}\ dx$ correct to three decimal places.

5. A body moves along a curve so that at a time *t*, it is at a point $(t^2 + 2, t^3 - 6, 6 - 4t)$. If the force acting on the body is $\mathbf{F} = 4t\,\mathbf{i} + 2t^2\,\mathbf{j} - 4t^2\,\mathbf{k}\ N$. Find the power developed by the force when $t = 2s$.

6. Derive the simplest formula based on Newton Raphson's method for solving the equation $\ln x + x - 2 = 0$. Hence taking the initial estimate, $x_0 = 1.5$, use the formula twice to solve the equation correct to three decimal places.

7. The probability that a patient recovers from a rare sickness is $\frac{3}{8}$. Given that 24 patients are diagnosed, find the;
   (i) standard deviation
   (ii) probability of the most likely number of patients who recover.

8. Show that the equation $x^3 - 2 = x$ has a root between 1.5 *and* 2. Use linear interpolation to find a better estimate to the root, correct to two decimal places.

END