Show your work. Answers alone are not sufficient. Box your answers. All questions carry the same weight.

1. Find all maxima, minima and saddle points of the function
   \[ f(x, y) = x^2 + 2xy. \]

2. Find a unit vector normal to the surface defined by
   \[ z = x^2 + e^{(x+y)} \]
   at the point \((0, 0, 1)\).

3. Find the Taylor series of the function
   \[ f(x) = \frac{x^{17}}{2 + x^2}. \]

4. Find the interval of convergence for the power series
   a) \[ \sum_{n=0}^{\infty} x^n, \]
   b) \[ \sum_{n=0}^{\infty} \frac{x^n}{n!}. \]

5. Find the distance from the point \((1, 7, -2)\) to the plane defined by \(2x - 3y + z = 4\).

6. Given that the position of a particle at time \(t\) is defined by \(\mathbf{r}(t) = ti - e^t\mathbf{j}\), find the component of the acceleration normal to the velocity vector.

7. Find the area of the triangle with vertices \((1, 0, 0)\), \((0, 1, 0)\), \((0, 0, 1)\).