

Name _____ Date _____

Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

1. (15 Points) Find the maximum of $f(x, y) = 4x^2 - 4xy + y^2$ subject to the constraint $x^2 + y^2 = 1$.

Answer : _____

2. (15 Points) Find the minimum distance between the origin and the plane $x + 3y - 2z = 4$.

Answer: _____

3. (10 points) Take the region $R = \{(x, y) : 0 \leq x \leq 6, 0 \leq y \leq 4\}$, the function $f(x, y) = x^2 + 2y^2$, and the partition P of R into six equal squares by the lines $x = 2$, $x = 4$, and $y = 2$. Approximate $\iint_R f(x, y) dA$ by calculating the corresponding Riemann sum $\sum_{k=1}^6 f(\bar{x}_k, \bar{y}_k) \Delta A_k$, assuming that (\bar{x}_k, \bar{y}_k) are the centers of the six squares.

Answer: _____