Name:
Directions: Please show all your work leading to your answers. Having some correct work with an incorrect answer will earn you partial credit.

Consider the function $f(x, y)=4 x^{2}+10 y^{2}$.

1. Classify the critical points of $f$ and determine local maximum or local minimum values at the points, if applicable. (8 points)
2. Find the maximum and minimum values of $f$ subject to the constraint $x^{2}+y^{2}=4$. ( 10 points)
3. Use parts (1) and (2) to find the absolute maximum and minimum values of $f$ on the set $D=\left\{(x, y) \mid x^{2}+y^{2} \leq 4\right\}$. (2 points)
