

Instructions: Show all work, and provide exact answers. For full credit will be given to the steps shown than for the final answer. Be sure to provide thorough explanations.

1. Find and classify all extrema for $f(x, y) = x^2 + y^2 + 8x - 10y$.

$$f_x = 2x + 8 = 0 \Rightarrow x = -4$$

$$f_y = 2y - 10 = 0 \Rightarrow y = 5$$

$$(-4, 5)$$

$$f_{xx} = 2 \leftarrow \text{concave up } \cup$$

$$f_{xy} = 0$$

$$f_{yy} = 2$$

$$(2)(2) - 0 = 4 > 0$$

max or min

2. Find a linear regression equation for:

| | | | | | |
|--------------------------|------|------|------|------|-------|
| Years since 1997, x | 0 | 10 | 11 | 12 | 18 |
| Minimum hourly wage, y | 5.15 | 5.85 | 6.55 | 7.25 | 10.10 |

- a. Write the equation.

$$Y = 0.257X + 4.359$$

- b. What does the regression equation predict for the minimum hourly wage in 2020 and 2025?

$$2020 - 1997 = 23$$

$$Y(23) = 10.27$$

$$Y(28) = 11.55$$