Mathematics II

Sixth Practice

1. Find all the stationary points of the following functions and classify them:

$$a) \quad f(x,y) = ye^x - 3x - y + 5$$
$$b) \quad f(x,y) = x^3 - y^2 - 3x + 2y$$
$$c) \quad f(x,y) = x^2 + 2y^2 - 3y^3$$
$$d) \quad f(x,y) = x^4 + y^4 - 4xy$$
$$e) \quad f(x,y) = x - x^3 - 4xy^2$$
$$f) \quad f(x,y,z) = z^2 e^{xy}$$

2. Find maxima and minima of the following functions f under the corresponding constraint V:

$$a) \quad f(x,y) = x + y, \quad V = \{(x,y) \in \mathbb{R}^2 : x^2 + y^2 = 1\}$$
$$b) \quad f(x,y) = \sqrt{x^2 + y^2} + y^2 - 1, \quad V = \{(x,y) \in \mathbb{R}^2 : x^2 + y^2 = 9\}$$
$$c) \quad f(x,y) = xy, \quad V = \{(x,y) \in \mathbb{R}^2 : x^2 + y^2 = 1\}$$
$$d) \quad f(x,y,z) = y\sqrt{1 + z^2}, \quad V = \{(x,y,z) \in \mathbb{R}^3 : (x-1)^2 + y^2 + z^2 = 4\}$$