HW #10

Question 1. List all the **nonempty** boundary pieces of the following domains.
- (1) $\{(x, y) \mid x \geq 0,\ y \geq 0\}$
- (2) $\{(x, y) \mid -1 \leq x \leq 1,\ -x^2 \leq y \leq x^2\}$
- (3) $\{(x, y, z) \mid x^2 + y^2 + z^2 \leq 9,\ x \leq 0,\ y \geq 0\}$

Question 2. Find the global maximum and minimum values of
$$f(x, y, z) = e^{xyz}$$
on the domain
$$\{(x, y, z) \mid 4x^2 + y^2 + 4z^2 = 12\}$$

Question 3. Find the global maximum and minimum values of
$$f(x, y) = 2xy - x^2 + y^2 + 3x - y$$
on the domain
$$\{(x, y) \mid 0 \leq x \leq 2,\ -1 \leq y \leq 2\}$$

Question 4. Find the global maximum and minimum values of
$$f(x, y, z) = 2x^2 + 2y^2 - z^2 + 4xy$$
on the domain
$$\{(x, y, z) \mid x^2 + y^2 + z^2 \leq 1,\ x + y + z \geq 1\}$$