1

$f(x,y) = x^2 + y^2 - 2x$
$D = \triangle[(2,0),(0,2),(0,-2)]$

$\nabla f = \langle 2x-2, 2y\rangle$
$\nabla f = 0 \iff (x,y) = (1,0)$

$f(1,0) = -1$
$f(2,0) = 0$
$f(0,2) = 4$
$f(0,-2) = 4$

$y = -x + 2$
$f(x,y) = x^2 + (-x+2)^2 - 2x = 2x^2 - 6x + 4$
$f'_x(x,y) = 4x - 6$
$f'_x(x,y) = 0 \iff (x,y) = (1.5, 0.5)$
$f(1.5, 0.5) = -0.5$

$x = 0$
$f(x,y) = y^2$
$f'_y(x,y) = 2y$
$f'_y(x,y) = 0 \iff (x,y) = (0,0)$
$f(0,0) = 0$

$y = x - 2$
$f(x,y) = x^2 + (x-2)^2 - 2x = 2x^2 - 6x + 4$
$f'_x(x,y) = 4x - 6$
$f'_x(x,y) = 0 \iff (x,y) = (1.5, -0.5)$
$f(1.5, -0.5) = -0.5$

$f(1,0) = -1$
$f(2,0) = 0$
$f(0,2) = 4$
$f(0,-2) = 4$
$f(1.5, 0.5) = -0.5$
$f(0,0) = 0$
$f(1.5, -0.5) = -0.5$

Maximums: $(0,2),(0,-2)$ at 4
Minimums: $(1,0)$ at -1

□

2

$f(x, y) = y^2 + 2x^2$
$x^2 + y^2 = 1$

$f(x, y) = 1 + x^2 \quad x \in [-1, 1]$

$f'_x(x, y) = 2x$
$f'_x(x, y) = 0 \iff (x, y) = (0, 1)|(0, -1)$
$f(0, 1) = 1$
$f(0, -1) = 1$

$f(-1, 0) = 2$
$f(1, 0) = 2$

Maximums: $(-1, 0), (1, 0)$ at 2
Minimums: $(0, 1), (0, -1)$ at 1
□