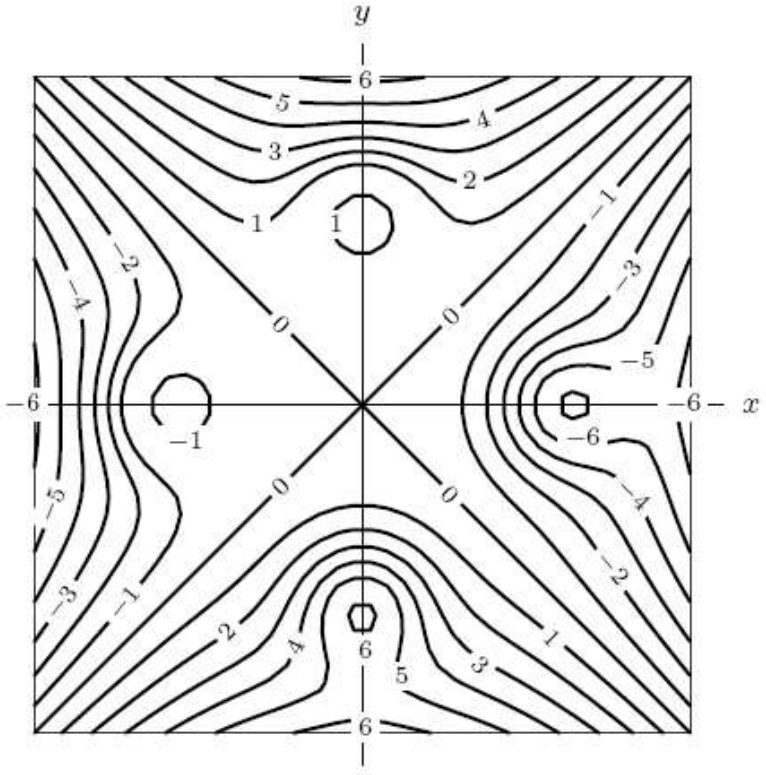
Classroom Voting Questions: Multivariable Calculus

15.2 Optimization

1. Estimate the global maximum and minimum of the functions whose level curves are given below. How many times does each occur?



   (a) Max ≈ 6, occurring once; min ≈ -6, occurring once

   (b) Max ≈ 6, occurring once; min ≈ -6, occurring twice

   (c) Max ≈ 6, occurring twice; min ≈ -6, occurring twice

   (d) Max ≈ 6, occurring three times; min ≈ -6, occurring three times

   (e) None of the above

2. What are the global maximum and minimum values of $f(x, y) = x^2 + y^2$ on the triangular region in the first quadrant bounded by $x + y = 2$, $x = 0$, $y = 0$?

   (a) Maximum = 2, Minimum = -2

   (b) Maximum = 2, Minimum = 0

(c) Maximum = 4, Minimum = 2

(d) Maximum = 4, Minimum = 0

3. The function $f(x, y) = x^3 + 12xy + y^4$ has:

   (a) no global maxes or mins

   (b) a global max, but no global min

   (c) a global min, but no global max

   (d) both a global min and a global max

4. Which of the following would be enough evidence to conclude that a smooth function $f(x, y)$ has a global min?

   (a) D is always positive

   (b) $f_{xx} > 0$ and $f_{yy} > 0$

   (c) $f(x, y)$ has no saddle points or local maxes

   (d) none of the above