

Quiz 7; Wednesday, March 9
MATH 53 with Professor Stankova
Section 116; 3-4
GSI: Eric Hallman

Student name:

You have 10 minutes to complete the quiz. Calculators are not permitted, and remember to show your calculations and explain your reasoning in order to receive full credit.

1. Minimize the function $f(x, y) = 5x^2 - 2xy + 5y^2$ given the constraints $x \geq 0, y \geq 1$.

ANSWER: $\nabla f(x, y) = \langle 10x + 2y, 10y + 2x \rangle$ and so has a critical point (a minimum) only at $(0, 0)$. This is outside of our domain so the minimum must occur on the boundary.

When $x = 0$, $g(y) := f(0, y) = 5y^2$ has a minimum at $y = 0$, but this is outside the domain.

When $y = 1$, $h(x) := f(x, 1) = 5x^2 - 2x + 5$ has a minimum at $x = 1/5$. This is inside the domain, so the constrained minimum is at $(1/5, 1)$.