

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. A goat is in a valley where the elevation as a function of position is given by $E(x, y) = x^2 - 4xy + 4y^2 - 4$. If the goat is at position $(3, 2)$ and running in the direction $\langle 1, 1 \rangle$, is it currently going uphill or downhill? $\langle E_x, E_y \rangle = \langle 2x - 4y, 8y - 4x \rangle$, which is equal to $\langle -2, 4 \rangle$ at the point $(3, 2)$. So in the direction $\langle 1, 1 \rangle$ the directional derivative is equal to $\langle -2, 4 \rangle \cdot \langle 1, 1 \rangle / \sqrt{2} = \sqrt{2}$. Since this number is positive, the goat is running uphill.