

# MATH 335 S2019

## Quiz I

2019-03-07

Read the problems carefully and be sure to show your work. No cell phones or calculators are allowed. Please turn off your phone to avoid any disturbances.

1. (10 pts) Compute the gradient of  $\phi(x, y, z) = x^2 + y^2 + z^2 + xy - 3x$  and hence find the minimum value of  $\phi$ .