You have 25 minutes to do this quiz. You may not use any books or notes while you do the quiz nor discuss the quiz with anyone.

1. The height above sea level at a point \((x, y)\) is given by the function \(h(x, y) = x^2y^3\). The units for the height function are meters and the units for xy position are km.
   i. Give the rate of change of height if one starts at the point \((x_0, y_0) = (1, 2)\) and moves in the direction given by the vector \(u = (1/\sqrt{2}, 1/\sqrt{2})\). What are the units for this derivative?

   ii. In what direction should you move so as to increase the height most quickly? What is the rate of change of height in this direction of greatest increase? Give units.

   iii. Make a sketch in which you plot the point \((x_0, y_0) = (1, 2)\) and at that point you plot the vector \(\nabla h = \text{grad } h\).