1. Find a single vector with *all* of the following properties:

   (a) Magnitude 10

   (b) Angle of $45°$ with positive x-axis

   (c) Angle of $60°$ with positive y-axis

   (d) Positive z-component

2. The temperature of a gas in $°F$ is given by $T = 3x^2 - 5xy + 2y^2z$, with x, y, z in feet. *(What are the units of "2", "3", and "5"?)*

   (a) What is the rate of change in the temperature at the point $(1, 2, 3)$ in the direction of $\vec{v} = 2\hat{\imath} + \hat{\jmath} - 2\hat{k}$? *Give units!*

   (b) What is the direction of maximum rate of change of temperature at the point $(1, 2, 3)$?
   What are the units?

   (c) What is the maximum rate of change of temperature at the point $(1, 2, 3)$?
   Give units!

3. You are climbing a hill along the steepest path, whose slope at your current location is $\frac{1}{5}$. There is another path branching off at an angle of $30°$ $(\frac{\pi}{6})$. How steep is it?