1 The Gas

The temperature of a gas in $^\circ F$ 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 $\vec{\boldsymbol{v}} = 2\,\hat{\boldsymbol{x}} + \hat{\boldsymbol{y}} - 2\,\hat{\boldsymbol{z}}$?
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!

2 The Path

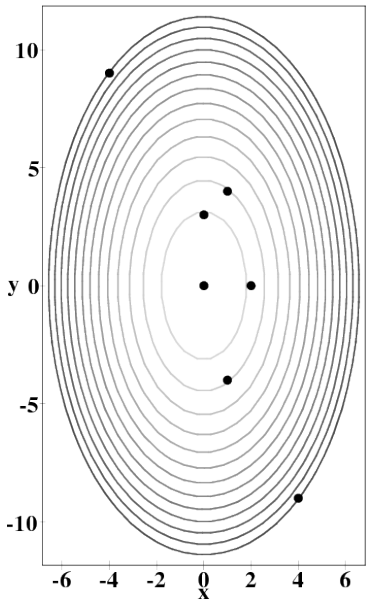
You are climbing a hill along the steepest path, whose slope at your current location is $\frac{1}{5}$. There is another path branching off at an angle of 30° $(\frac{\pi}{6})$. How steep is it?

3 The Hill (wrapup)

After completing the Hill activity, answer the following question:

On the topographic map below, draw the path from point $B = (4, -9)$ to the center (representing the top of the hill) that you believe represents the shortest path between those two point on the actual hill.

Justify your choice by explaining your reasoning.


10
5
y 0
-5
-10
-6
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-2
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2
4
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x