

GAUSS'S LAW

Suppose you are standing on a hill. You have a topographic map, which uses rectangular coordinates (x, y) measured in miles. Your global positioning system says your present location is at one of the following points (pick one):

A: $(1, 4)$ B: $(4, 9)$ C: $(4, 9)$

D: $(1, 4)$ E: $(2, 0)$ F: $(0, 3)$

Your guidebook tells you that the height h of the hill, in feet above sea level is given by:

$$h(x, y) = (2xy - 3x^2 - 4y^2 - 18x + 28y + 1200)$$

- Where is the top of the hill located?
- How high is the hill?
- Draw a topographic map of the hill (your map should have at least 3 level curves; label your location on the map). What is your height?
- Starting at your present location, in what compass direction (2-D unit vector) do you need in order to climb the hill as steeply as possible?
- How steep is the hill in you start at your present location and go in this direction?
- In what direction in space (3-d vector) would you actually be moving if you started at your present location and walked in the compass direction you found in the previous problem?