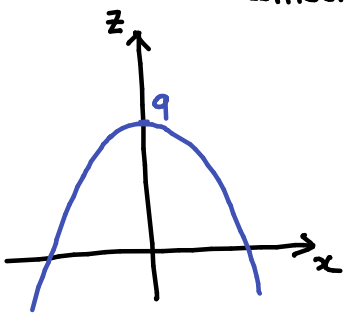
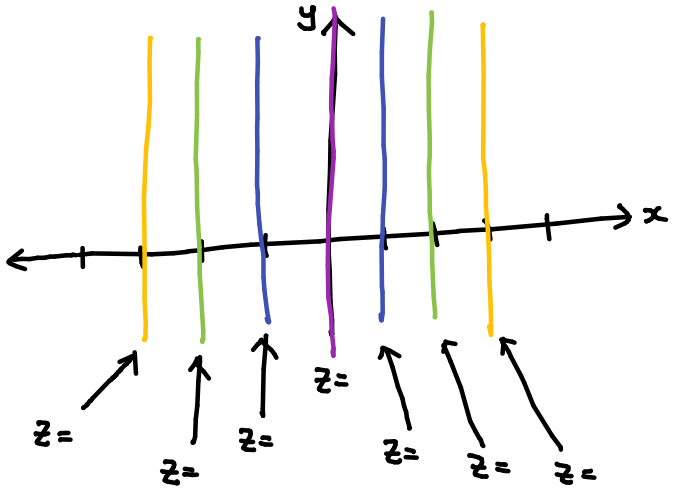
Lecture 18: TT1 Review Day 1

★ See Lecture 17 for a table of what to know + some review questions.

Question 1: The cross-section of a surface for every fixed y is $z = 9 - x^2$. Four of its contours are pictured below. Label each contour with its appropriate z-value.





A:

Question 2: The temperature of an iron plate is given by $T(x,y,z) = (x^2+y^2+z^2)^{1/4}$ in °C, where x, y, z are in mm.

a) Describe the level surfaces and explain their practical meaning.

b) An ant on the iron plate is at a location that is 3°C. It prefers a location that is 2°C or 4°C. Which of these locations is closest to the ant?

Question 3: Find values c_1, c_2 so that $f(x,y) = \begin{cases} \frac{xy^3}{x^3+y^6}, & (x,y) \neq (0,0), (1,1), \\ c_1, & (x,y) = (1,1), \\ c_2, & (x,y) = (0,0), \end{cases}$ is continuous if they exist.

Question 4: a) Which pt is furthest away from $A = (1,1,1)$:

$B = (2,3,2)$, $C = (3,3,4)$, $D = (2,1,3)$.

b) Fill in the blanks. The area of the parallelogram with vertices A, B, C, D is given by

$\| \_\_\_ \times \_\_\_ \|$

Question 5: a) The wind is pushing a sailboat with a force $\vec{F_1} = (2, -3)$ while the river is pushing it with a force $\vec{F_2} = (5, 1)$. What is the net force?

b) If the boat starts at position $(1, 1)$ and it travels 10m, what is its position now?

Question 6: (The many ways to find a plane) Find the plane that is:

a) perpendicular to $\vec{v}$ and containing a pt P_0.

b) parallel to a plane and containing a pt P_0.

c) containing 3 pts A, B, C.

d) perpendicular to a plane and containing pts A, B.

e) containing a line and a pt P.

* When are 2 planes $\parallel$, $\perp$ or neither?