

Calc I/II quiz

January 17, 2025

Student name: _____. Do what you can in 15 minutes.

1. What are three *fundamental* dimensions for quantities? (Hint: They are represented by single letters.)
2. Using the fundamental dimensions from question (1), write down the dimension of each of these “kinds of stuff.”
 - Area
 - Velocity
 - Flow, e.g. volume per minute
3. What is the dimension of the *input space* for each of these functions? (Hint: don't overthink things.)
 - $f(x, t) \equiv \sin(x)e^t$
 - $g(a, b, c) \equiv \sqrt{\frac{a^2 - b^3}{\ln(c)}}$
 - $h(u, v) \equiv 1$
4. Draw a horizontal and a vertical line to represent the coordinate axes. Then draw a graph of $\text{dnorm}()$. Put 2 or 3 tick marks on the vertical axis with numerical values.
5. Most of the *pattern-book functions* have a domain that is the entire number line, that is $-\infty < x < \infty$. Name two pattern-book functions where this is not true. (Hint: One of the two is missing only a single point on the number line.)

6. Figure 1 are contour plots showing two different functions.

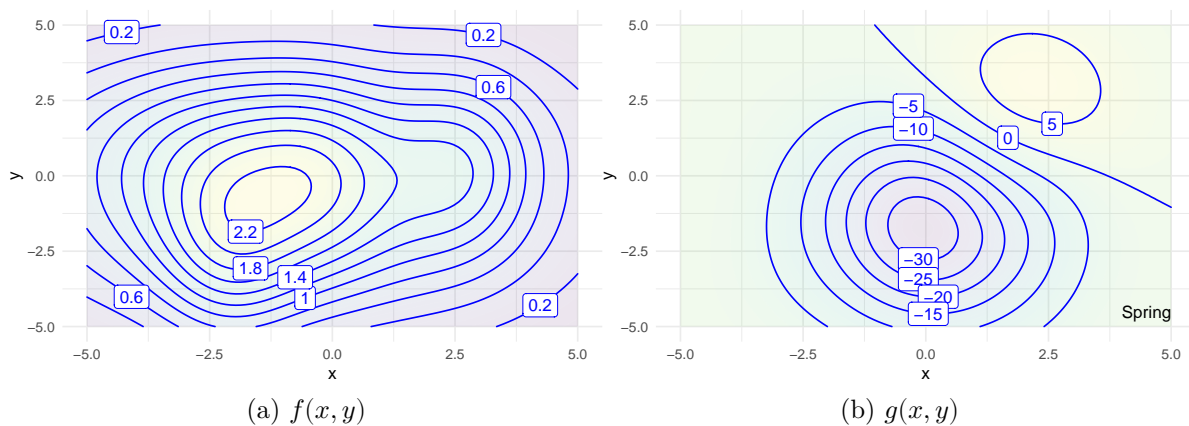


Figure 1: Contour plots for Question 6

- 6(a) Which function has the higher output value at $(x = 0, y = 0)$?
- 6(b) Each of the functions has a “mountain.” Mark the **top** of the mountain with an x and then give numerically the input coordinates (approximately) that correspond to that top.
- 6(c) The location of a spring (that is, a source of water) is marked on one graph. Trace out, approximately, the path taken by the stream stemming from that spring.

7. Consider the contour plot below. Draw in plausible contours for output values 0 and 8.

