

## Section 14.1: Functions of Several Variables

**Problem 1.** Let  $f(x, y) = e^{\sqrt{y-x^2}}$ .

- (a) Evaluate  $f(-2, 5)$ . (b) Find and sketch the domain of  $f$ .  
 (c) Find the range of  $f$ .

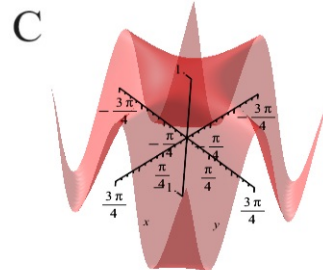
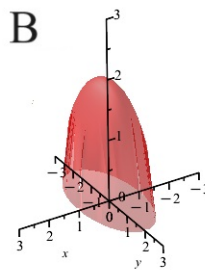
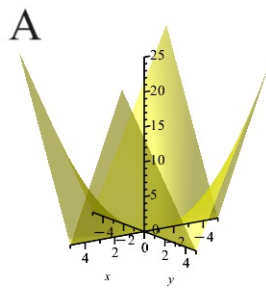
**Problem 2.** Find and sketch the domain of

(a)  $g(x, y) = \sqrt{x} + \sqrt{4 - 4x^2 - y^2}$  (b)  $h(x, y) = \frac{\sqrt{xy}}{x+1}$

**Problem 3.** Match each 2-variable function below with their graph.

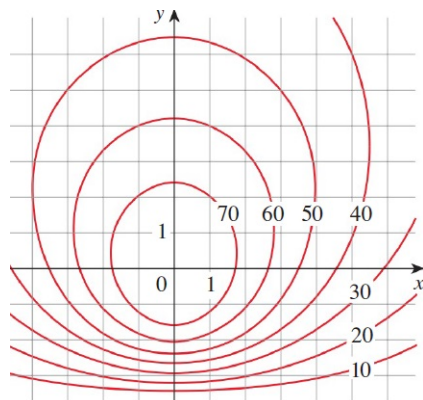
**HINT:** Find trace curves with planes that are **not** coordinate planes for (a) and (b).

- (a)  $f(x, y) = \cos(xy)$  \_\_\_\_\_ (b)  $g(x, y) = |xy|$  \_\_\_\_\_  
 (c)  $h(x, y) = \sqrt{4 - 4x^2 - y^2}$  \_\_\_\_\_



**Problem 4.** Find and sketch the domain of  
 $f(x, y, z) = \sqrt{4 - x^2} + \sqrt{9 - y^2} + \sqrt{1 - z^2}$ .

**Problem 5.** A contour map for a function  $f$  is shown. Use it to estimate the values of  $f(-3, 3)$  and  $f(3, -2)$ . What can you say about the shape of the graph?



**Problem 6.** Level curves (isotherms) are shown for the typical water temperature (in  $^{\circ}\text{C}$ ) in Long Lake (Minnesota) as a function of depth and time of year. Estimate the temperature in the lake on June 9 (day 160) at a depth of 10 m and on June 29 (day 180) at a depth of 5 m.

