

Solutions.

Name: (print) _____

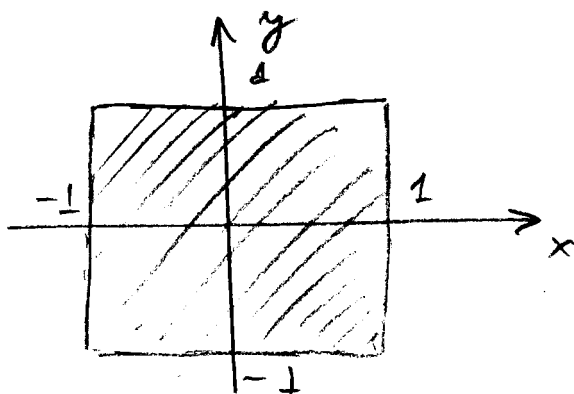
Each problem is worth 2 points. Show all your work.

1. (a) Find the domain of the function (use set notation to express your answer) (b) Sketch the domain of the function in the xy -plane:

$$f(x, y) = \sqrt{1-x^2} - \sqrt{1-y^2}$$

$$D = \{ (x, y) : 1-x^2 \geq 0, 1-y^2 \geq 0 \}$$

$$= \{ (x, y) : -1 \leq x \leq 1, -1 \leq y \leq 1 \}.$$



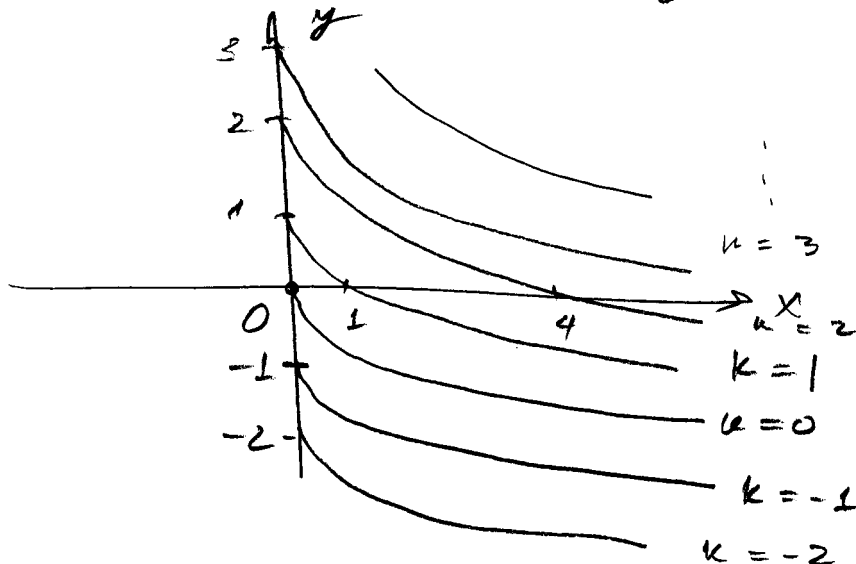
(the boundary
of the square
is included
in D.)

2. Draw a contour map of the function, showing and marking several level curves:

$$f(x, y) = \sqrt{x} + y$$

Domain : $\{ x \geq 0 \}$

level curves: $\sqrt{x} + y = k ; y = k - \sqrt{x}$



Please turn over...

3. Find the indicated partial derivative:

$$f(x, y) = \ln(x + \sqrt{x^2 + y^2}); \quad f_x(3, 4).$$

$$\frac{\partial f}{\partial x} = \frac{1}{x + \sqrt{x^2 + y^2}} \frac{\partial}{\partial x} (x + \sqrt{x^2 + y^2}) = \frac{1 + \frac{x}{\sqrt{x^2 + y^2}}}{x + \sqrt{x^2 + y^2}}$$

$$= \frac{1}{\sqrt{x^2 + y^2}} \frac{x + \sqrt{x^2 + y^2}}{x + \sqrt{x^2 + y^2}} = \frac{1}{\sqrt{x^2 + y^2}}$$

(everywhere except $y=0, x \leq 0$.)

$$f_x(3, 4) = \frac{1}{\sqrt{3^2 + 4^2}} = \frac{1}{5}.$$