

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

## DEPARTMENT OF MATHEMATICS AND STATISTICS

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SECTION 2.1

Math 2000 Worksheet

WINTER 2020

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### SOLUTIONS

1. (a)  $f(4, 7) = \frac{\sqrt{1}}{7-3} = \frac{2}{4} = \frac{1}{2}$
- (b)  $f(4, -7) = \frac{\sqrt{4}}{-7-3} = \frac{2}{-10} = -\frac{1}{5}$
- (c)  $f(-4, 7) = \frac{\sqrt{-4}}{7-3}$  which is undefined, because we cannot take the square root of a negative number
- (d)  $f(3, 1) = \frac{\sqrt{3}}{1-3} = -\frac{\sqrt{3}}{2}$
- (e)  $f(1, 3) = \frac{\sqrt{1}}{3-3} = \frac{1}{0}$  which is undefined, because we cannot divide by zero
- (f)  $f(0, 0) = \frac{\sqrt{0}}{0-3} = \frac{0}{-3} = 0$
- (g)  $f(9, 9) = \frac{\sqrt{9}}{9-3} = \frac{3}{6} = \frac{1}{2}$
2. (a) We require  $x + y \geq 0$ , or  $y \geq -x$ . Hence the domain is the set of all points lying on or above the line  $y = -x$ .
- (b) We require  $x \geq 0$  and  $y \geq 0$ , so the domain is the set of all points lying in the first quadrant of the  $xy$ -plane (including the axes).
- (c) We require  $xy - 3 \neq 0$ , so  $y \neq \frac{3}{x}$ . Hence the domain is the set of all points not lying on the hyperbola with the equation  $y = \frac{3}{x}$ .
- (d) We require  $16 - x^2 - y^2 \geq 0$  so  $x^2 + y^2 \leq 16$ , which is the interior of the circle of radius 4 centred at the origin (including the circle). We further require  $x^2 + y^2 - 1 > 0$  so  $x^2 + y^2 > 1$ , which is the exterior of the circle of radius 1 centred at the origin (excluding the circle). So the domain of the function is the set of points outside the circle of radius 1 but inside the circle of radius 4 (including this latter circle).