ZCA 110 Kalkulus dan Aljabar

Semester I, Sesi 2005/06

QUIZ 1 (22 Julai 2005)

Nama:
No. Kad Matriks:
Kumpulan Tutorial:

Determine the domains and ranges of each of the following functions:

(a) $f(x) = 3(x - |x|)$ (b) $f(x) = |x|/2x$ (c) $h(x) = \begin{cases} \dfrac{x^2-9}{x-3} & \text{if } x \neq 3 \\ x = 6 & \text{if } x = 3 \end{cases}$

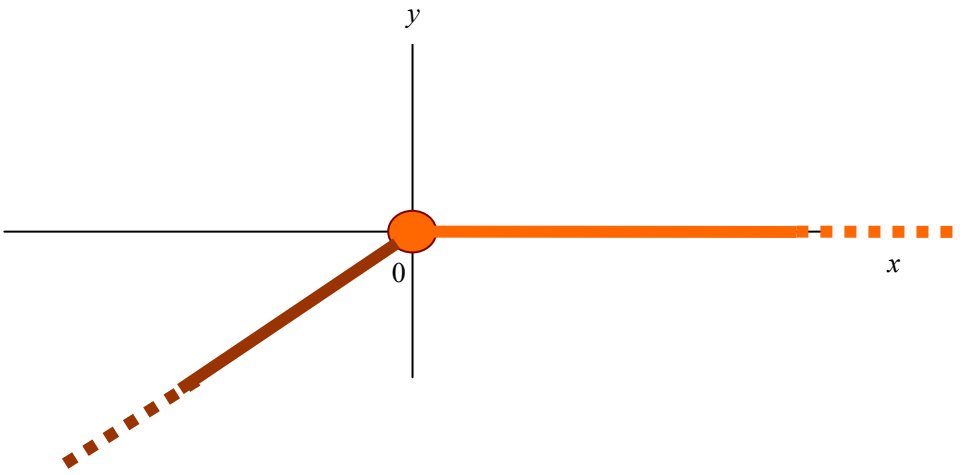
(d) $y = \sqrt{\dfrac{x}{x-2}}$

Solutions

(a) Schaum's series, Supp. Pro 18 (j), pg 58

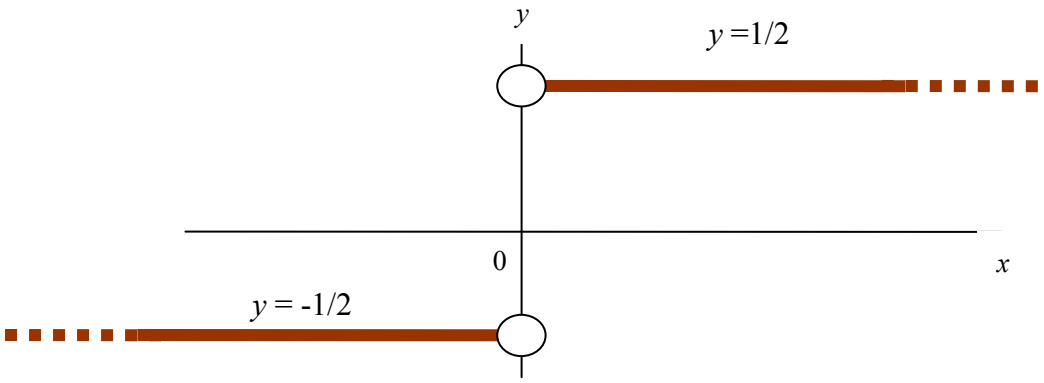
$$f(x) = \begin{cases} 0 & x \geq 0 \\ 6x & x < 0 \end{cases}$$

Domain, all numbers, $x = (-\infty.+\infty)$; range, $y \leq 0$



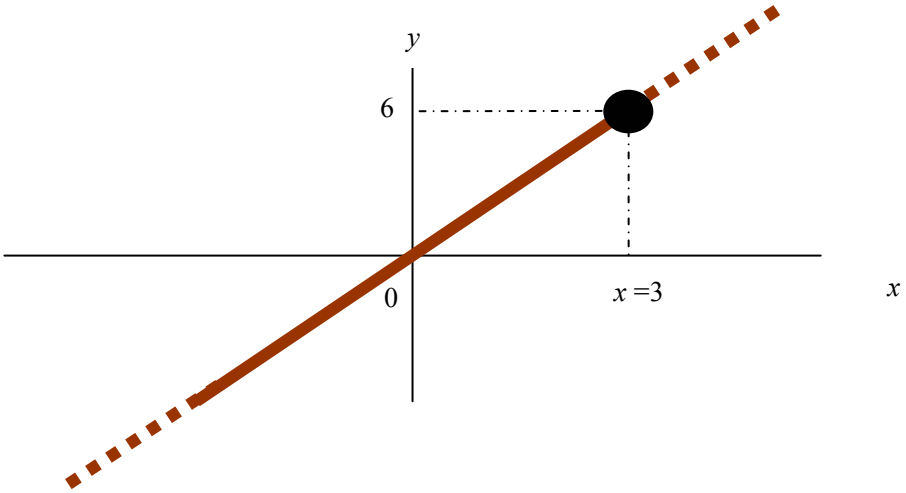
(b) Schaum's series, Supp. Pro 18 (i), pg $f(x) = \begin{cases} \dfrac{1}{2} & x > 0 \\ -\dfrac{1}{2} & x < 0 \\ \text{undefined} & x = 0 \end{cases}$

Domain, all numbers except $x = 0$; range is the set of {½, - ½}. Note: values between ½ and – ½ is not the range of the function.



(c) Schaum's series, Supp. Pro 22 (c), pg 58

Domain and range: all real numbers. Note that $x = 3$ is in the domain.



(d) Schaum's series, Supp. Pro 16 (h), pg 58, modified

The argument in the square root must be equal or larger than zero: $x/(x\text{-}2) \geq 0$. At $x = 2$, y is not defined. So there is a discontinuity at $x = 2$. This means $x = 2$ cannot be in the domain of the function.

In order for the argument in the square root to be larger than 0:

$$\frac{x}{x-2} \geq 0, x \neq 2$$

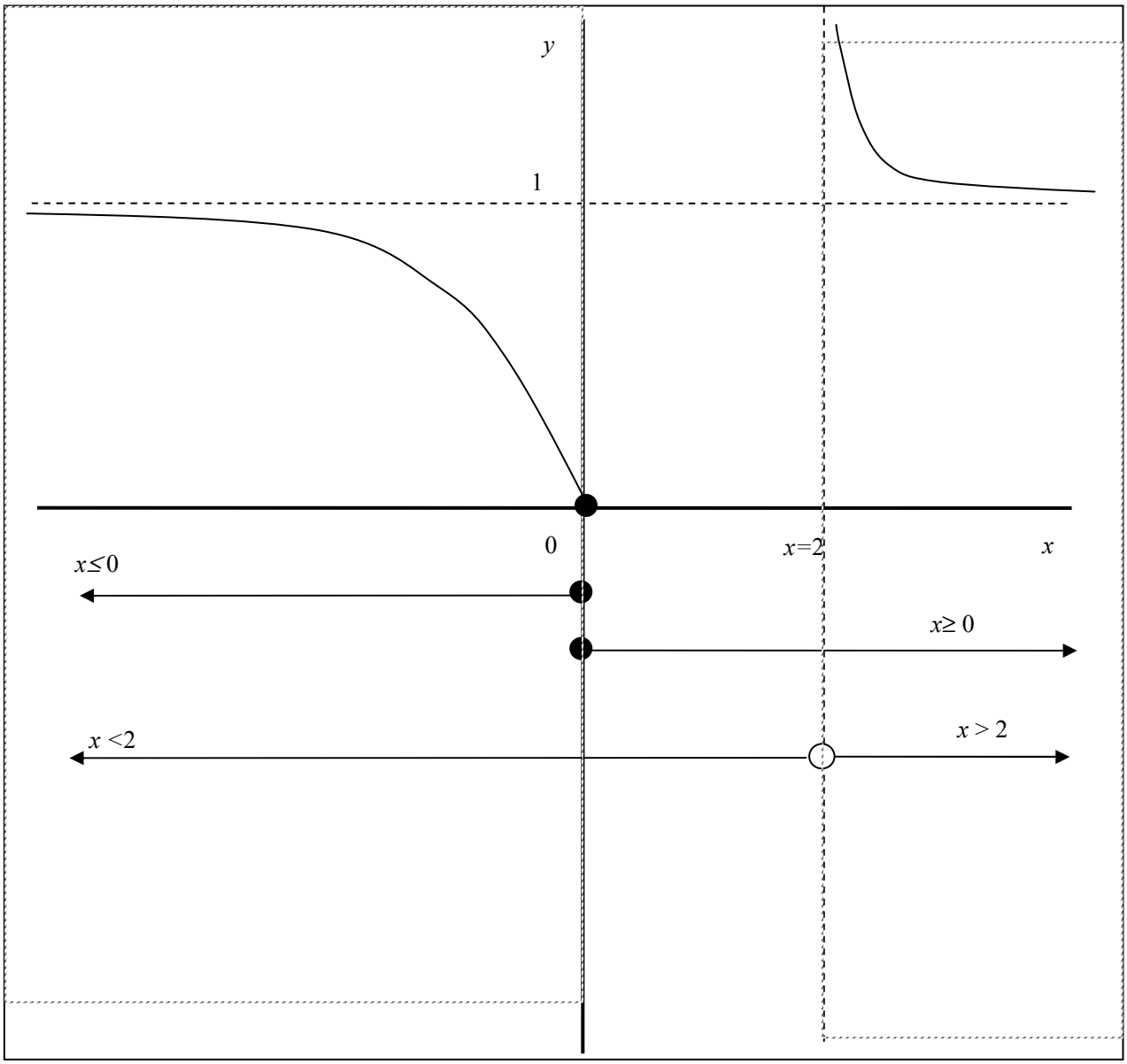
$$\Rightarrow x \geq 0 \text{ and } x > 2, \text{ or}$$

$$x \leq 0 \text{ and } x < 2$$

The domain and range is sketched as followed.

Domain: $x \leq 0$ and $x > 2$

Range: $\infty > y \geq 0, \quad y \neq 1$


y
1
0
x=2
x
x≤0
x≥ 0
x <2
x > 2