SOLUTIONS

June 2015

Question 11 — 1 mark

Explain how the graph of $y = \dfrac{3(x-1)}{(x-1)}$ is different than the graph of $y = 3$.

There is a hole in the graph of $y = \dfrac{3(x-1)}{(x-1)}$ at $(1,3)$

Question 26 — 4 marks

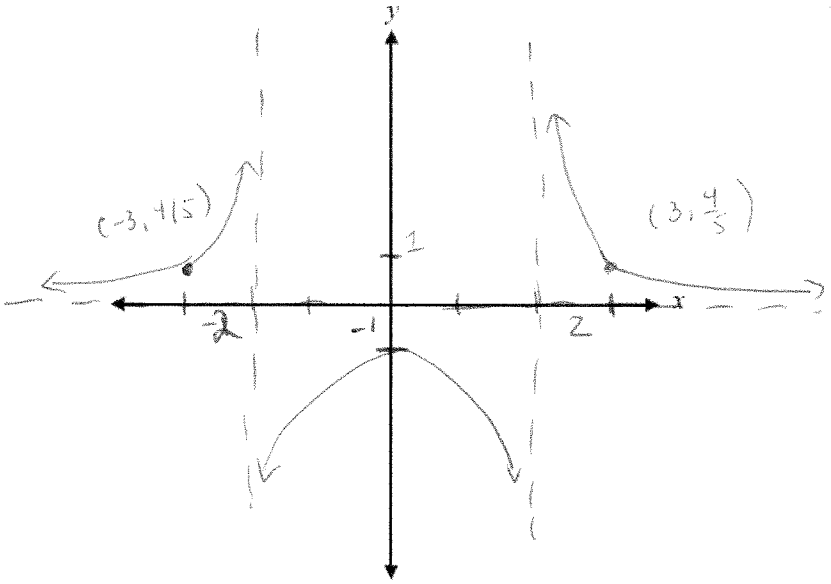
Sketch the graph of the function $f(x)$ and determine the y-intercept.

$$f(x) = \frac{4}{(x-2)(x+2)}$$

when $x = 3$

$$y = \frac{4}{(3-2)(3+2)}$$

$$y = \frac{4}{5}$$



y-intercept: -1

$$f(0) = \frac{4}{-2(2)}$$

$$= \frac{4}{-4}$$

$$= -1$$

Question 31 — 2 marks

Match each function with its correct description.

a) The graph of this function has a vertical asymptote at $x = -1$.

b) The graph of this function has a point of discontinuity (hole) at $x = 3$.

c) The graph of this function has a horizontal asymptote at $y = 4$.

d) The domain of this function is $x \in \mathbb{R}$.

Place the appropriate letter in this column.

$f(x) = \dfrac{4}{x^2+1}$ D

$g(x) = \dfrac{4x}{x+3}$ C

$h(x) = \dfrac{4(x-3)(x+2)}{(x-3)}$ B

$k(x) = \dfrac{4(x-3)}{(x+3)(x+1)}$ A

Question 38 — 1 mark

Determine the coordinates of the point of discontinuity (hole) for the graph of the function $y = \dfrac{(2-x)(x-3)}{(x-2)}$.

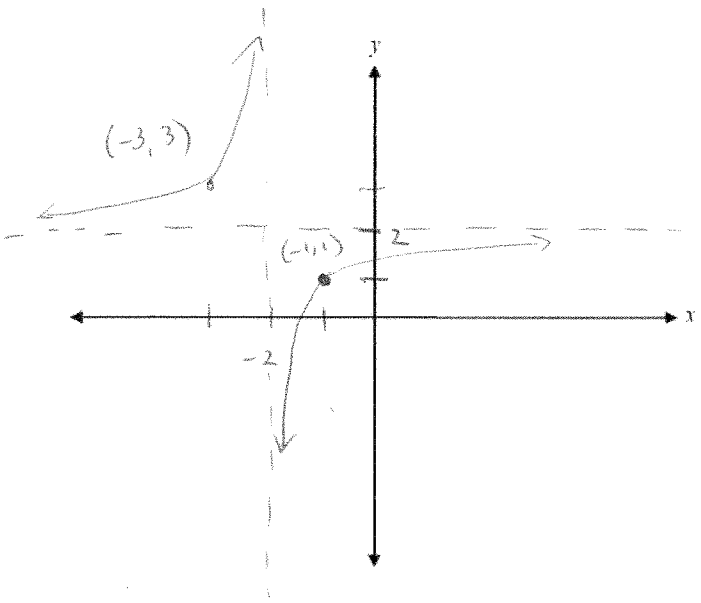
$y = \dfrac{-(x-2)(x-3)}{(x-2)}$

$y = -(x-3) \quad x \neq 2$

$(2, 1)$

Question 41 3 marks

Sketch the graph of $f(x)=\frac{2x+3}{x+2}$.



when $x=-1$

$y=\frac{-2+3}{-1+2}$

$y=1$

when $x=-3$

$y=\frac{2(-3)+3}{-3+2}$

$y=\frac{-3}{1}$

$y=3$

Question 24 1 mark

Which of the following is true about the two functions below?

$f(x)=\frac{(x+2)(x-2)}{x-2}$ $g(x)=\frac{(x-2)(x+1)}{(x+2)(x-2)}$

a) Both have a point of discontinuity (hole) when $x=2$. ✓

b) Both have the same vertical asymptote. ×

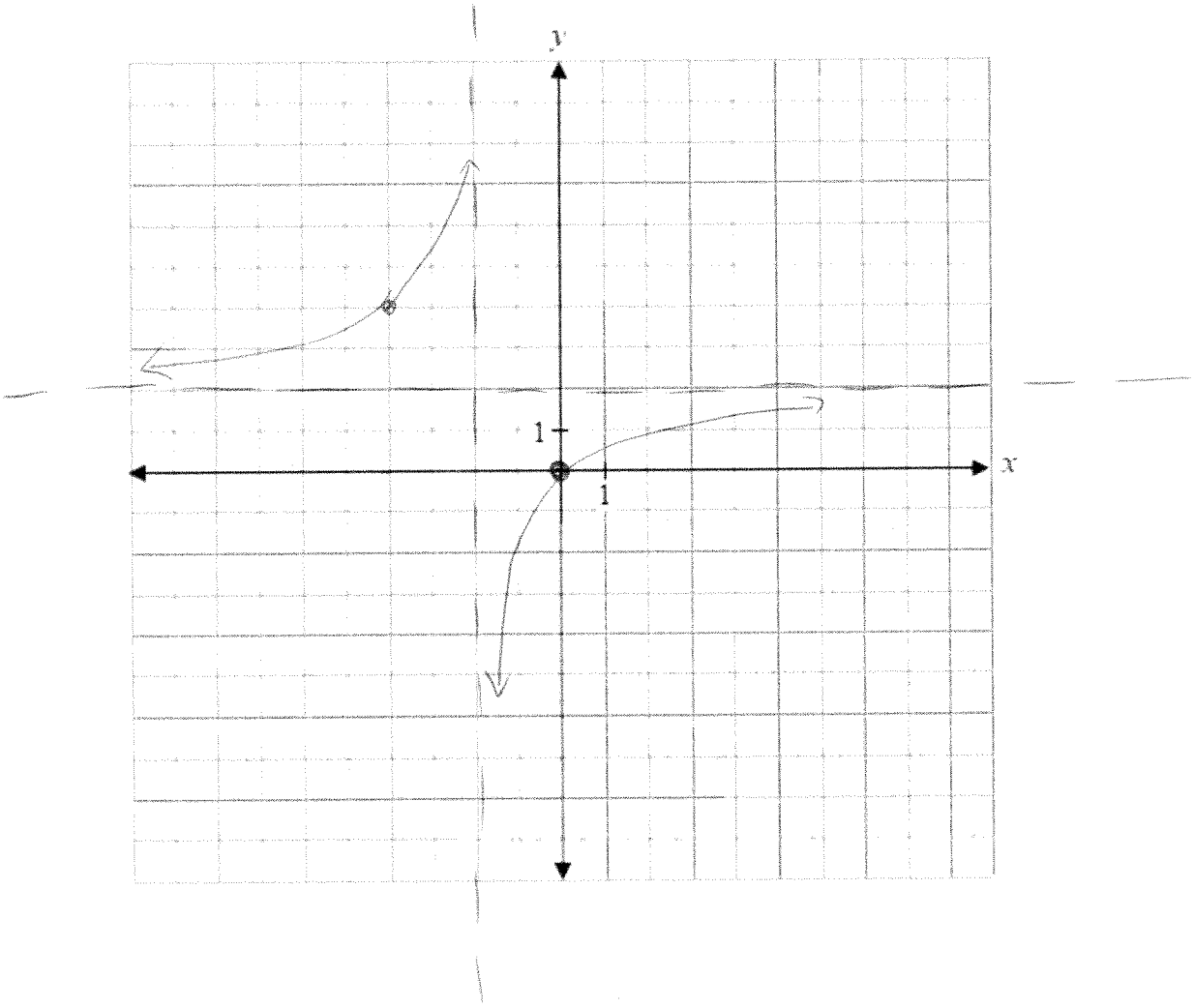
c) Both have the same horizontal asymptote. ×

d) Both have the same y-intercept. ×

Question 48

3 marks

Sketch the graph of $y = \dfrac{2x}{x+2}$.



Question 30 — 1 mark

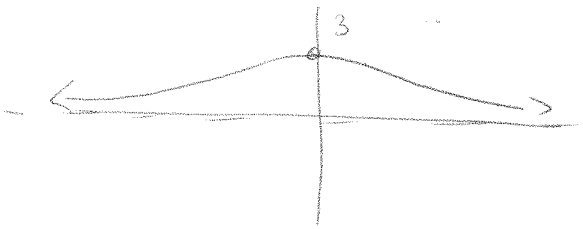
Write the equation of the horizontal asymptote for the function $f(x) = \frac{x-3}{x-2}$.

$y = 1$

Question 36 — 2 marks

Identify the domain and range of the following function:

$f(x) = \frac{3}{x^2+1}$



domain: $(-\infty, \infty)$

range: $(0, 3]$

Question 44

4 marks

Sketch the graph of the following function:

$$f(x) = \frac{x-2}{(2x-3)(x-2)}$$

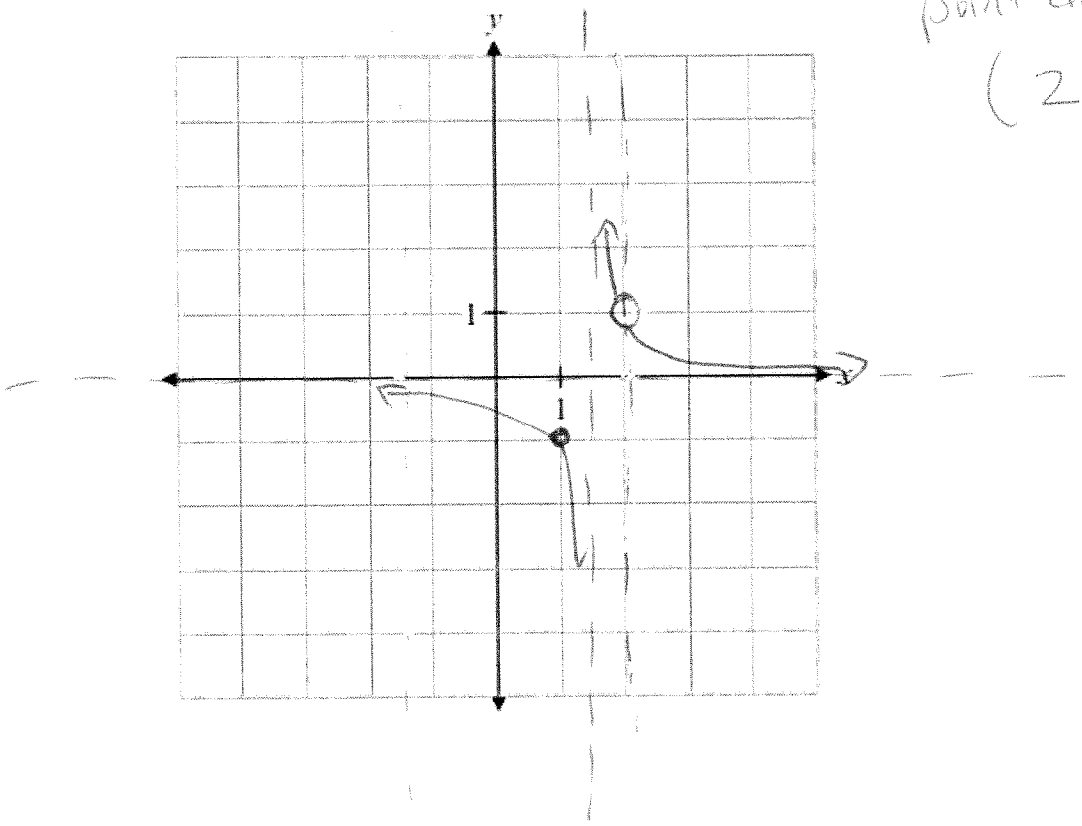
$x = 3/2$ $x = 2$

$$f(x) = \frac{1}{2x-3}, \quad x \neq 2$$

$x = 3/2$

point discontinuity

$(2, 1)$



Question 34 — 2 marks

The graph of a rational function, $f(x)$, has a point of discontinuity when $x = 2$ and an asymptote when $x = 4$. Write a possible equation for $f(x)$.

$y = \dfrac{(x-2)}{(x-2)(x-4)}$

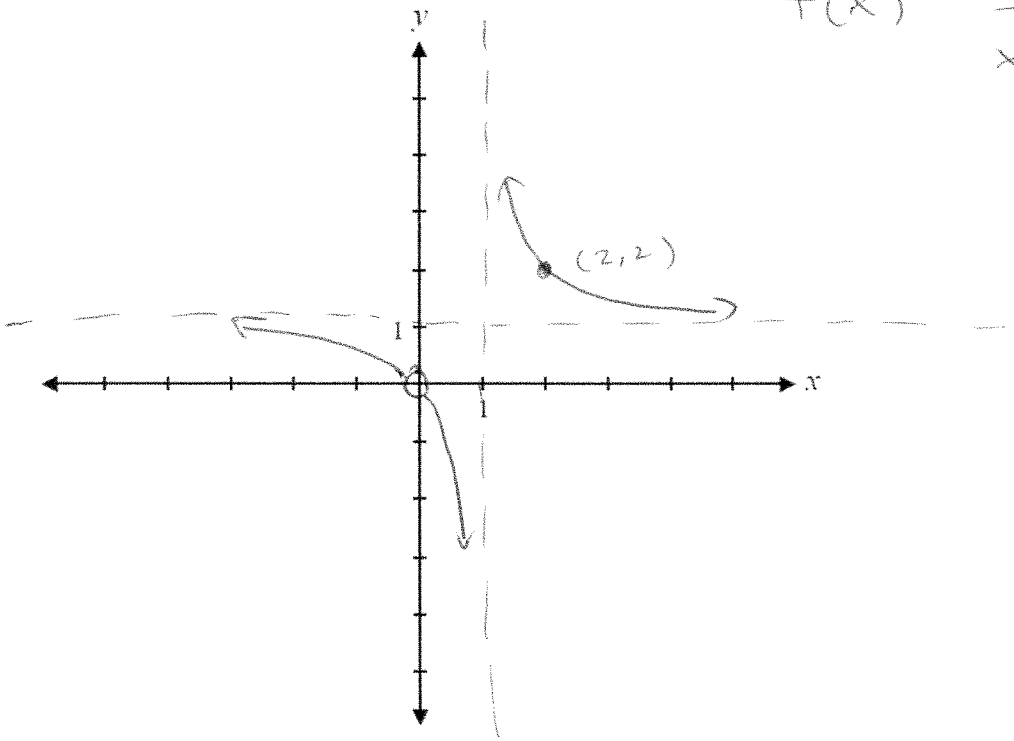
Question 43 — 4 marks

Sketch the graph of the function $f(x) = \dfrac{x^2}{x^2 - x}$.

$f(x) = \dfrac{x^2}{x(x-1)}$

$f(x) = \dfrac{x}{x-1} \quad x \neq 0$

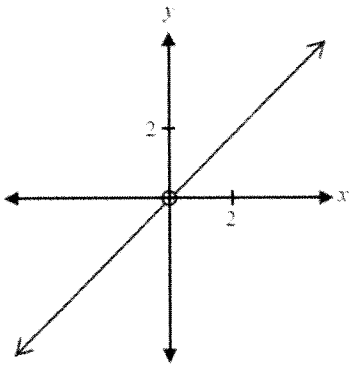
hole @ (0, 0)



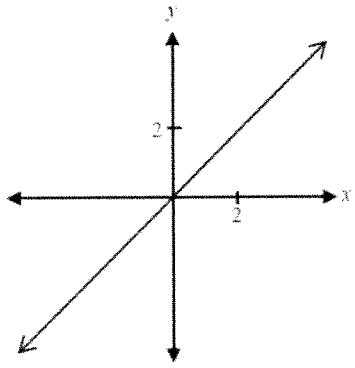
Question 20 — 1 mark

Identify the graph of the function $y = \frac{x}{x}$. $y = 1 \quad x \neq 0$

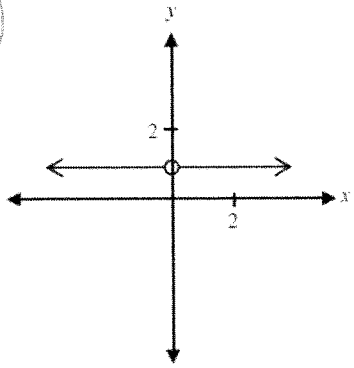
a)



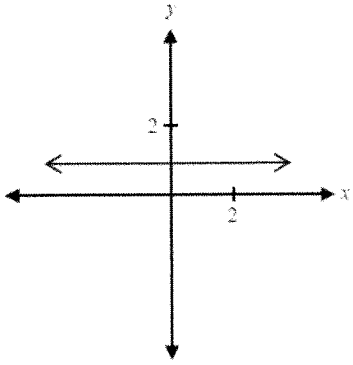
b)



c)

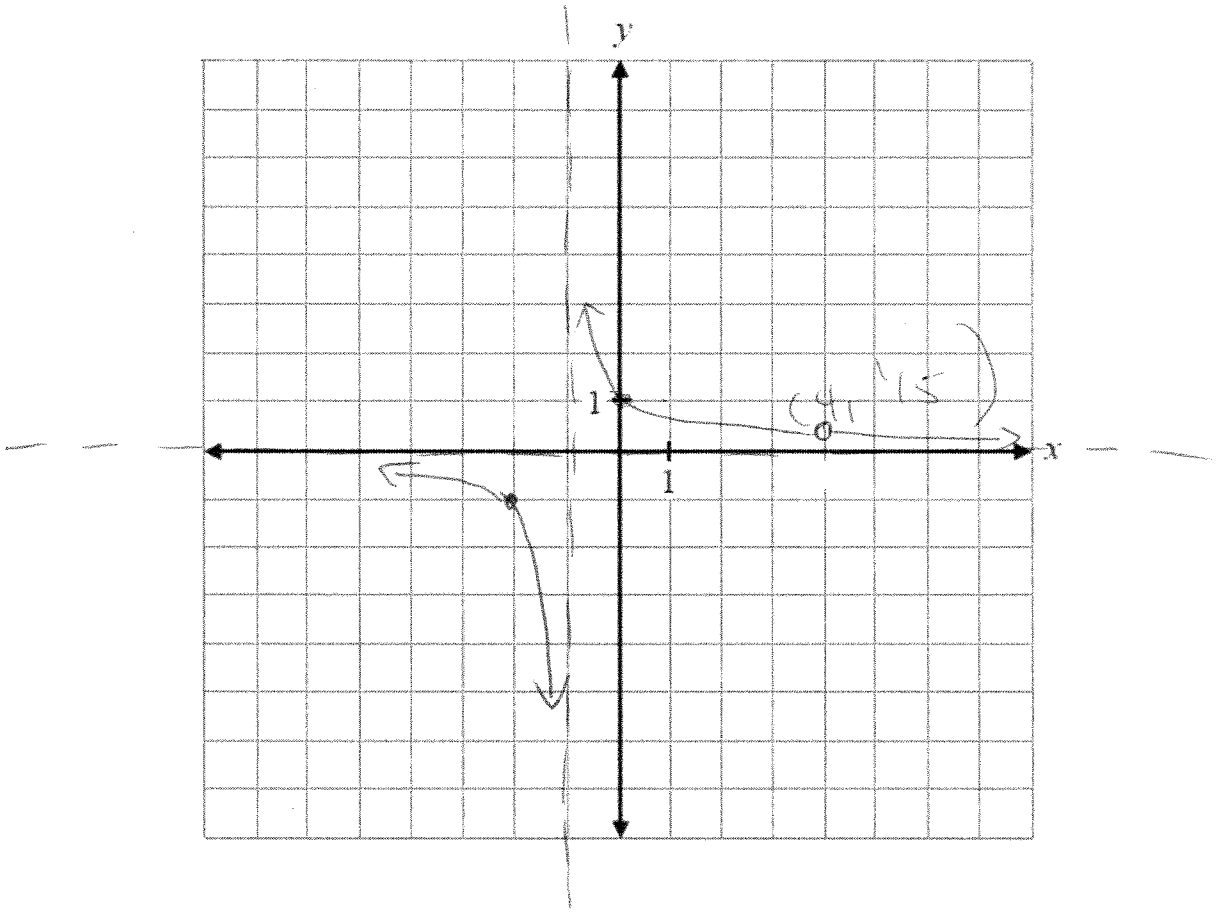


d)



Question 45 — 3 marks

Sketch the graph of $f(x) = \dfrac{x-4}{x^2-3x-4}$.



$$f(x) = \frac{x-4}{(x-4)(x+1)}$$

$$f(x) = \frac{1}{x+1}, \quad x \neq 4$$

point discontinuity @ $\left(4, \frac{1}{5}\right)$