SOLUTIONS TO APRIL 27 EXERCISES

BY

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Tolentino Tuition, Grade 11 *Mathematics*

28 *April* 2026

CONTENTS

1.A. and 1.B.

$y = \frac{1}{x}$

$x \cdot y = \frac{1}{x} \cdot x$

$xy = 1 \neq 0$

$\therefore x, y \neq 0$

{ $y = \frac{1}{x}$ has a vertical asymptote at $y = 0$, and a horizontal asymptote at $x = 0$ }

1.C.

$y = \frac{1}{x}$, $y = x$

$\therefore \frac{1}{x} = x$

$x \cdot \frac{1}{x} = x \cdot x$

$1 = x^2$

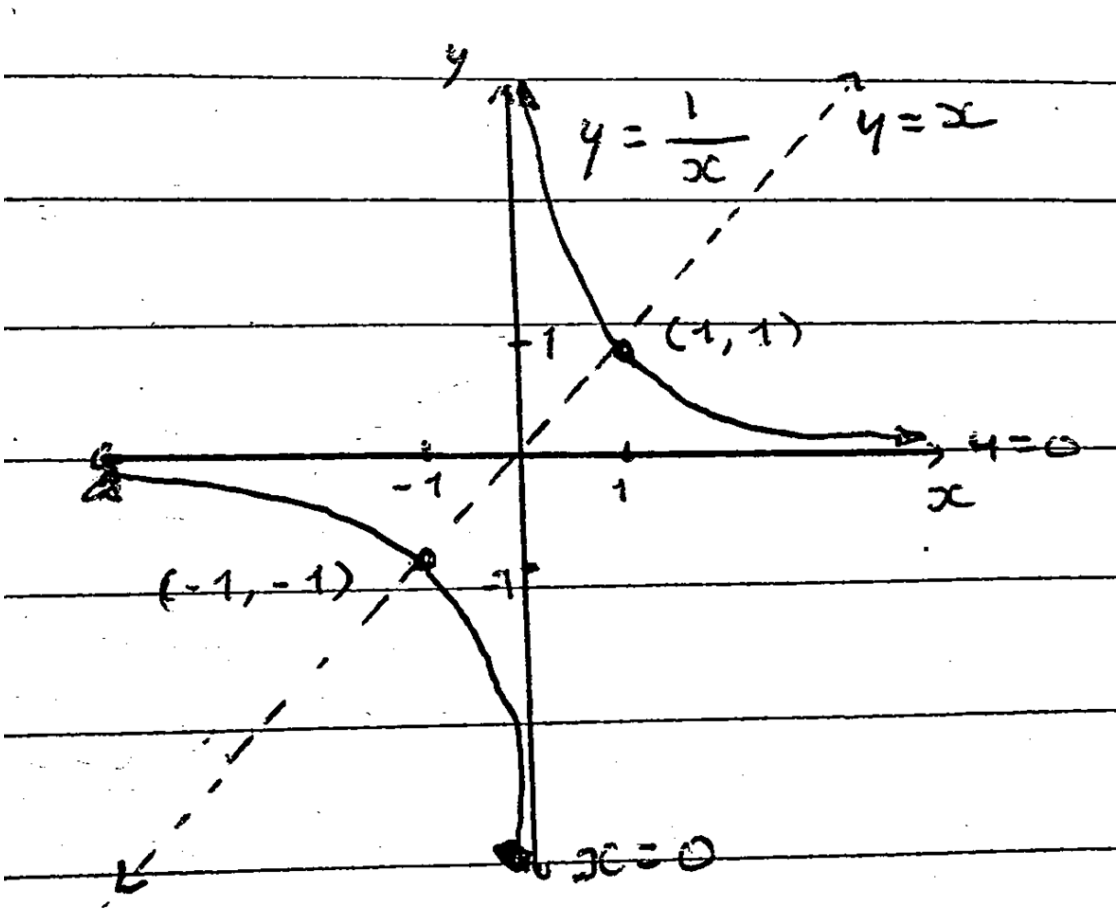
$\pm\sqrt{1} = x$

$\pm 1 = x$

But $y = x$,

$\therefore y = \frac{1}{x}$ and $y = x$ intersect at $(1, 1)$ and $(-1, -1)$

EXERCISE 1.1 SKETCH



1.A. and 1.B.

$$y = \frac{3}{x}$$

$$x \cdot y = \frac{3}{x} \cdot x$$

$$xy = 3 \neq 0$$

$$\therefore x, y \neq 0$$

1.C.

$y = \frac{3}{x}$, $y = x$

$$\frac{3}{x} = x$$

$$x \cdot \frac{3}{x} = x \cdot x$$

$$3 = x^2$$

$$\pm\sqrt{3} = x$$

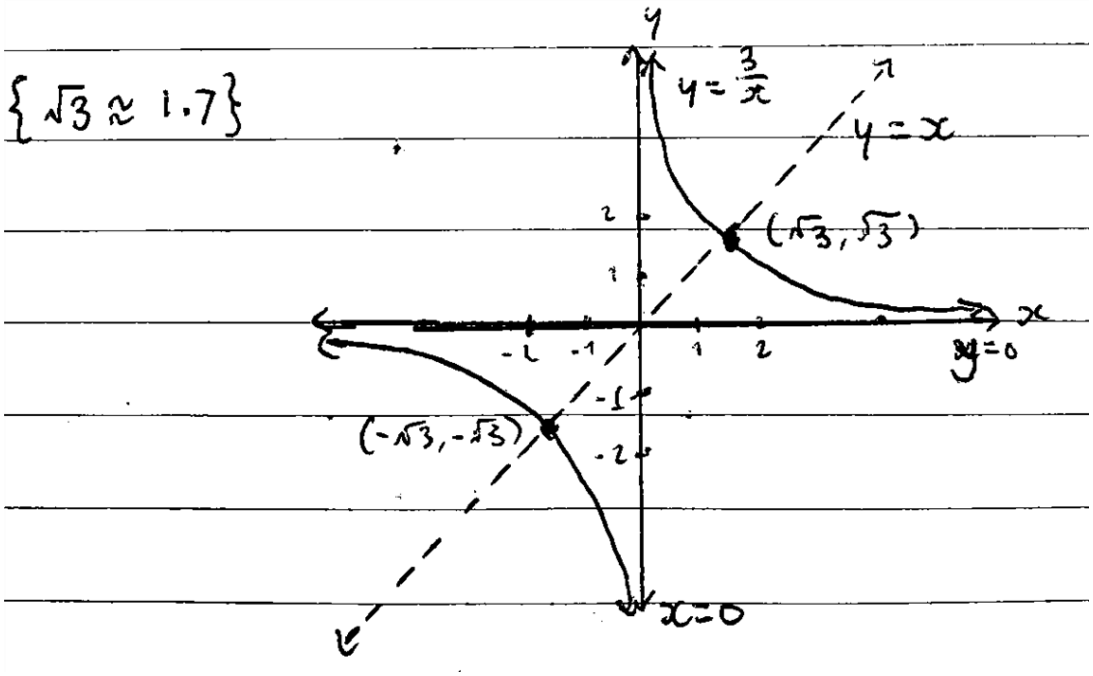
But $y = x$,

$\therefore y = \frac{3}{x}$ and $y = x$ intersect at $(\sqrt{3}, \sqrt{3})$ and $(-\sqrt{3}, -\sqrt{3})$

EXERCISE 2.1.D & 2.1 SKETCH

1.D.

Dilation of $y = \frac{1}{x}$ by a factor of 3 from the x axis, i.e $y = 3 \cdot \frac{1}{x}$, e.g. the point $(1,1)$ on $y = \frac{1}{x}$ becomes $(1,3)$ on $y = \frac{3}{x}$.



2.A. and 2.B.

$$y = 2 - \frac{7}{x}$$

$$y - 2 = 2 - 2 - \frac{7}{x}$$

$$y - 2 = -\frac{7}{x}$$

$$x \cdot (y-2) = -\frac{7}{x} \cdot x$$

$$x(y-2) = -7 \neq 0$$

$\therefore x \neq 0$

$\therefore y - 2 \neq 0$

$$y - 2 + 2 \neq 0 + 2$$

$$y \neq 2$$

2.C.

$y = 2 - \frac{7}{x}$ has its centre at

$(0, 2)$

{ (x asymptote, y asymptote) }

EXERCISE 2.2.D.

2.D.

$y = 2 - \frac{7}{x}$, $y = -x + 2$ {(1)}

$2 - \frac{7}{x} = -x + 2$

$2 - 2 - \frac{7}{x} = -x + 2 - 2$

$-\frac{7}{x} = -x$

$-1 \cdot -\frac{7}{x} = -1 \cdot -x$

$\frac{7}{x} = x$

$x \cdot \frac{7}{x} = x \cdot x$

$7 = x^2$

$\pm\sqrt{7} = x$ {(2)}

(2) into (1),

$y = -(\pm\sqrt{7}) + 2$

When $x = +\sqrt{7}$, $y = -(+\sqrt{7}) + 2$

$= -\sqrt{7} + 2$

When $x = -\sqrt{7}$, $y = -(-\sqrt{7}) + 2$

$= \sqrt{7} + 2$

$\therefore$ $y = 2 - \frac{7}{x}$ and $y = -x + 2$ intersect at $(\sqrt{7}, -\sqrt{7} + 2)$ and $(-\sqrt{7}, \sqrt{7} + 2)$

EXERCISE 2.2 SKETCH

Oops, we need an x intercept!

$$y = 2 - \frac{7}{x} = 0$$

$$2 - 2 - \frac{7}{x} = 0 - 2$$

$$-\frac{7}{x} = -2$$

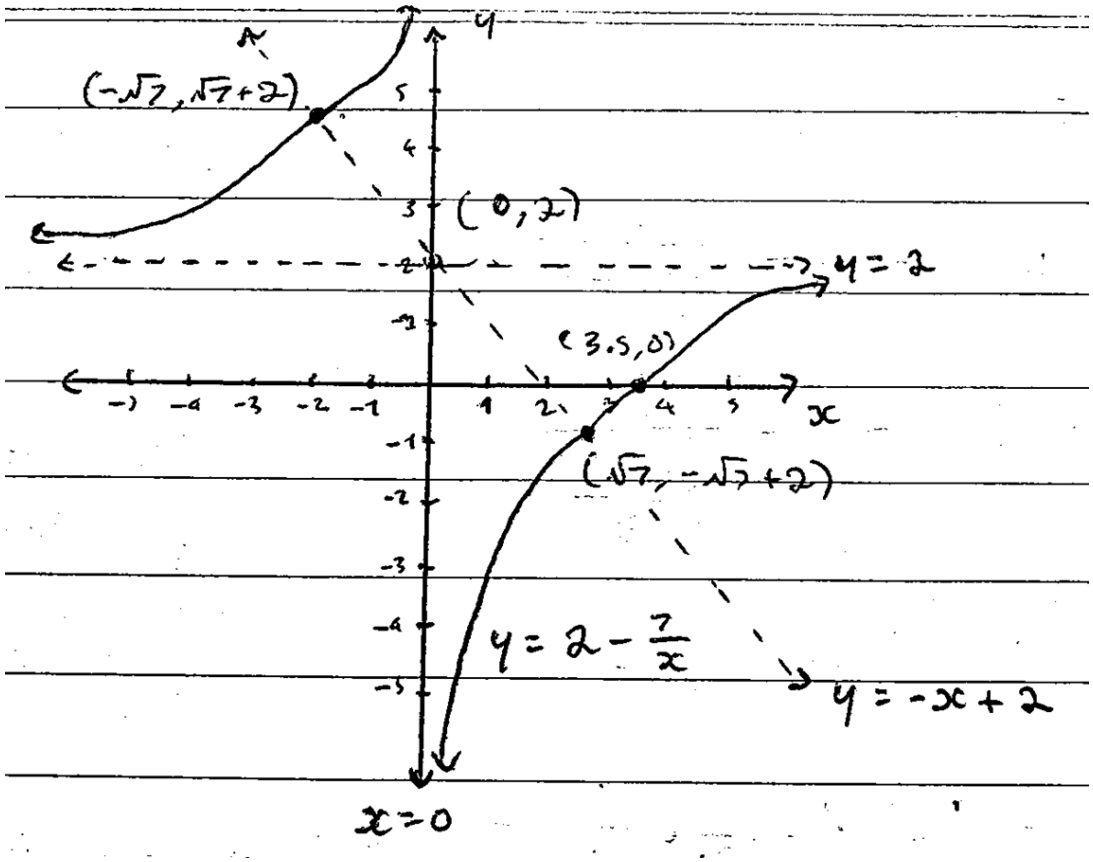
$$x \cdot -\frac{7}{x} = -2 \cdot x$$

$$-7 = -2x$$

$$\frac{-7}{-2} = \frac{-2x}{2}$$

$$x = \frac{7}{2} = 3.5$$

$\{\sqrt{7} \approx 2.6,$
$-\sqrt{7} \approx -2.6,$
$\sqrt{7}+2 \approx 4.6,$
$-\sqrt{7}+2 \approx -0.6\}$



1.A., 1.B. and 1.C.

$$y = -4 - \frac{2}{3x-3}$$

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

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

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

$$(3x-3)(y+4) = -2 \neq 0$$

$\therefore 3x-3 \neq 0$

$3x \neq 3$

$x \neq 1$

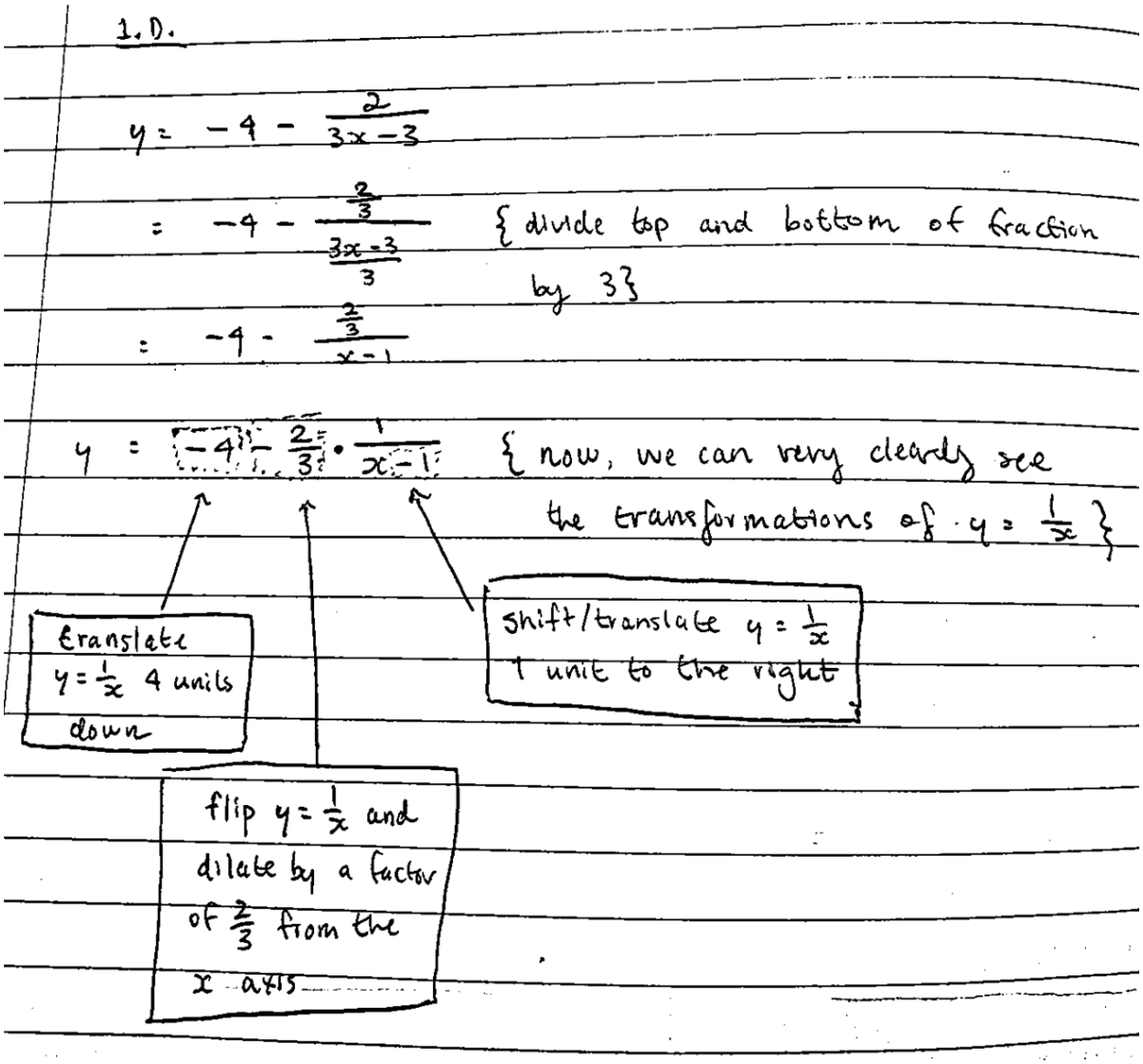
$\therefore y+4 \neq 0$

$y+4-4 \neq 0-4$

$y \neq -4$

$y = -4 - \frac{2}{3x-3}$ has its centre at $(1, -4)$

EXERCISE 3.1.D.



EXERCISE 3.1.E.

1.E.

$y = -4 - \frac{2}{3x-3}$, $y = -(x-1) - 4$ {(1)}

$-4 - \frac{2}{3x-3} = -(x-1) - 4$

$= -x - 3$

$-4(3x-3) - 2 = (-x-3)(3x-3)$

$-12x + 12 - 2 = -3x^2 + 3x - 9x + 9$

$-12x + 10 = -3x^2 - 6x + 9$

$1 = -3x^2 + 6x$

$-\frac{1}{3} = x^2 - 2x$

$0 = x^2 - 2x + \frac{1}{3}$

$\therefore x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(\frac{1}{3})}}{2(1)}$ $\left\{x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}\right\}$

$= \frac{2 \pm \sqrt{4 - \frac{4}{3}}}{2}$

$= \frac{2 \pm \sqrt{\frac{8}{3}}}{2}$

$= \frac{2}{2} \pm \frac{\sqrt{8/3}}{2}$

$x = 1 \pm \frac{\sqrt{8/3}}{2}$ {(2)}

Continued on Pages 13 & 14

(2) into (1)

$y = -(x-1) - 4$

$= -x - 3$

$= -\left(1 \pm \frac{\sqrt{8/3}}{2}\right) - 3$

When $x = 1 + \frac{\sqrt{8/3}}{2}$, $y = -\left(1 + \frac{\sqrt{8/3}}{2}\right) - 3$

$= -1 - \frac{\sqrt{8/3}}{2} - 3$

$= -4 - \frac{\sqrt{8/3}}{2}$

$y = \frac{-8 - \sqrt{8/3}}{2}$

When $x = 1 - \frac{\sqrt{8/3}}{2}$,

$y = -\left(1 - \frac{\sqrt{8/3}}{2}\right) - 3$

$= -1 + \frac{\sqrt{8/3}}{2} - 3$

$= -4 + \frac{\sqrt{8/3}}{2}$

$y = \frac{\sqrt{8/3} - 8}{2}$

$\therefore y = -4 - \frac{2}{3x-3}$ and $y = -(x-1) - 4$ intersect at $\left(1 + \frac{\sqrt{8/3}}{2}, \frac{-8 - \sqrt{8/3}}{2}\right)$ and $\left(1 - \frac{\sqrt{8/3}}{2}, \frac{\sqrt{8/3} - 8}{2}\right)$.

EXERCISE 3.1. SKETCH

Again, we need an x intercept, but also a y intercept this time!

$$y = -4 - \frac{2}{3x-3}$$

Let $y = 0 = -4 - \frac{2}{3x-3}$

$$-4 = \frac{2}{3x-3}$$

$$-4(3x-3) = 2$$

$$-12x + 12 = 2$$

$$0 = 12x - 10 \quad \{\text{oops}\}$$

$$10 = 12x$$

$$x = \frac{10}{12} \approx 0.83$$

Let $x = 0$,

$$y = -4 - \frac{2}{-3} = -\frac{10}{3} \approx -3.33$$

$$1 + \frac{\sqrt{8/3}}{2} \approx 1.8,$$

$$1 - \frac{\sqrt{8/3}}{2} \approx 0.2,$$

$$\frac{-8 - \sqrt{8/3}}{2} \approx -4.8,$$

$$\frac{\sqrt{8/3} - 8}{2} \approx -3.2 \}$$