

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Problem 1 (10 points). Consider the function

$$g(x) = \frac{x^2 - 8x + 15}{3x^2 + 9x + 6}$$

(a) (2 point) Factor the expression completely.

$$g(x) = \frac{(x-3)(x-5)}{3(x+1)(x+2)}$$

(b) (1 point) Find the x-intercepts of g.

Solve  $g(x) = 0$  ↗

$$(3, 0), (5, 0)$$

(c) (1 point) Find the y-intercepts of g.

Plug in  $x = 0$  →  $(0, 15/6)$

(d) (1 point) Find the vertical asymptotes of g, if they exist.

Find the singularities of  $g(x)$ , i.e., what make the denominator zero.

$$x = -1; x = -2$$

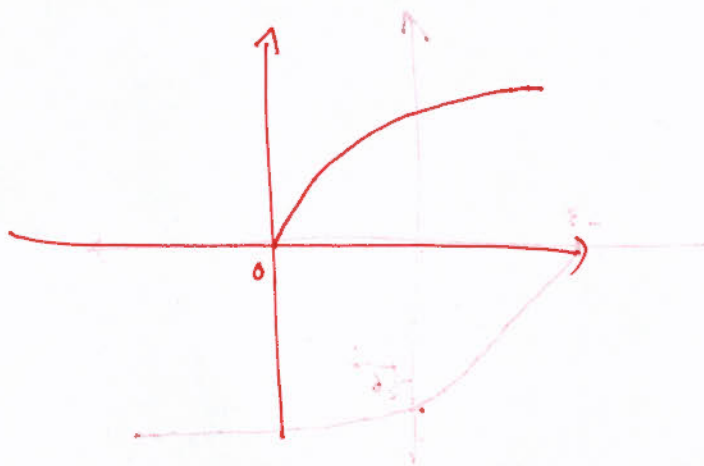
(e) (1 point) Find the horizontal asymptotes of g, if they exist.

Calculate the ratio of the leading coefficients.

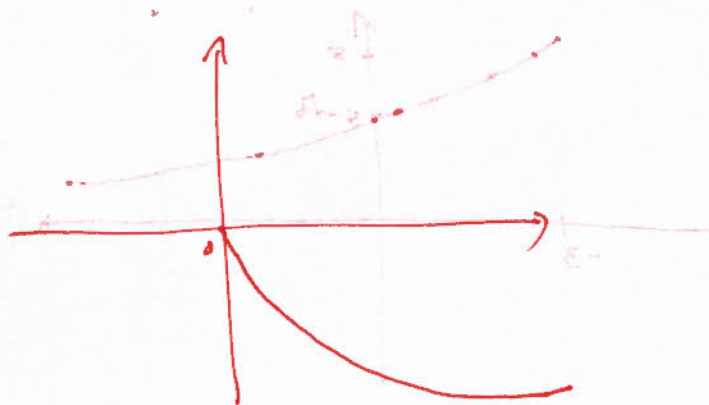
$$y = \frac{1}{3}$$



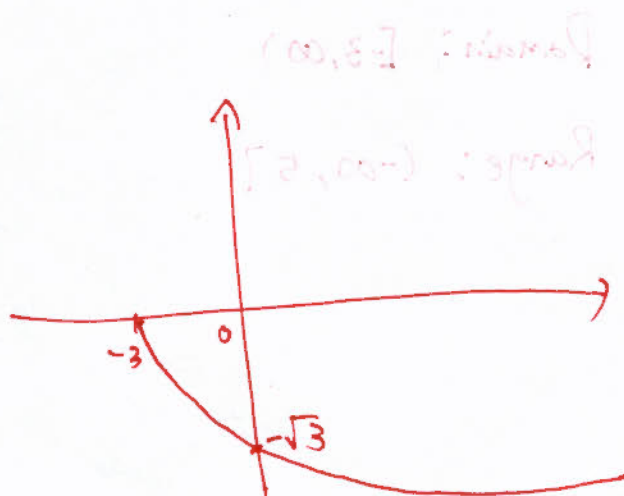
Problem 2 (10 points). (a) (1 point) Graph  $f_0(x) = \sqrt{x}$ .



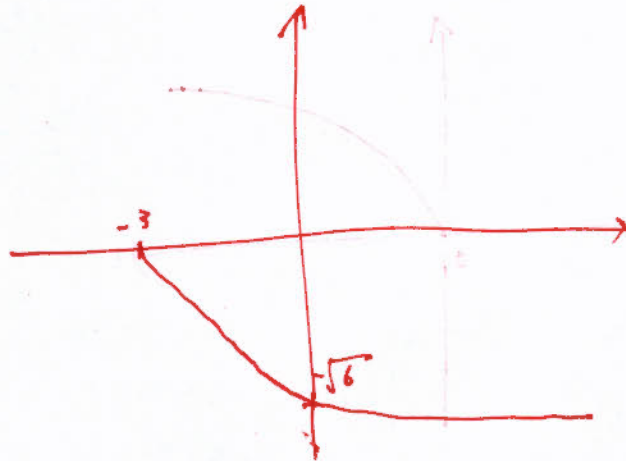
(b) (1 point) Graph  $f_1(x) = -\sqrt{x}$ .



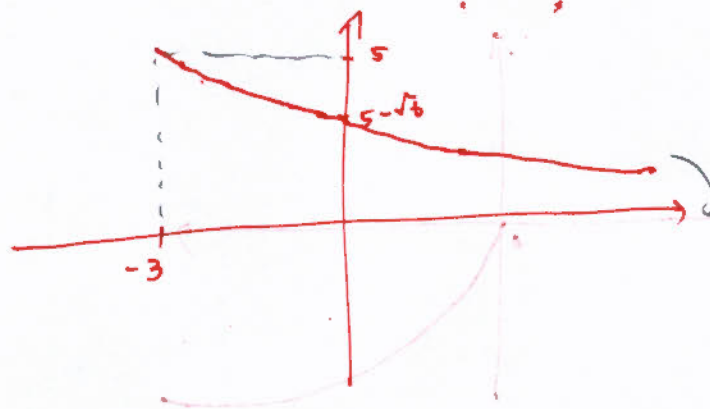
(c) (1 point) Graph  $f_2(x) = -\sqrt{x+3}$ .



(d) (2 points) Graph  $f_3(x) = -\sqrt{2(x+3)}$ .



(e) (3 points) Graph  $f_4(x) = -\sqrt{2(x+3)} + 5$ .



crosses the x-axis  
at  $x = \frac{19}{2}$

(f) (2 point) Find the domain and range of  $f_4(x) = -\sqrt{2(x+3)} + 5$ .

Domain:  $[-3, \infty)$

Range:  $(-\infty, 5]$

