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.

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

Solve $g(x) = 0$

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

Plug in $x = 0$ $\longrightarrow$ $(0, 15/6)$

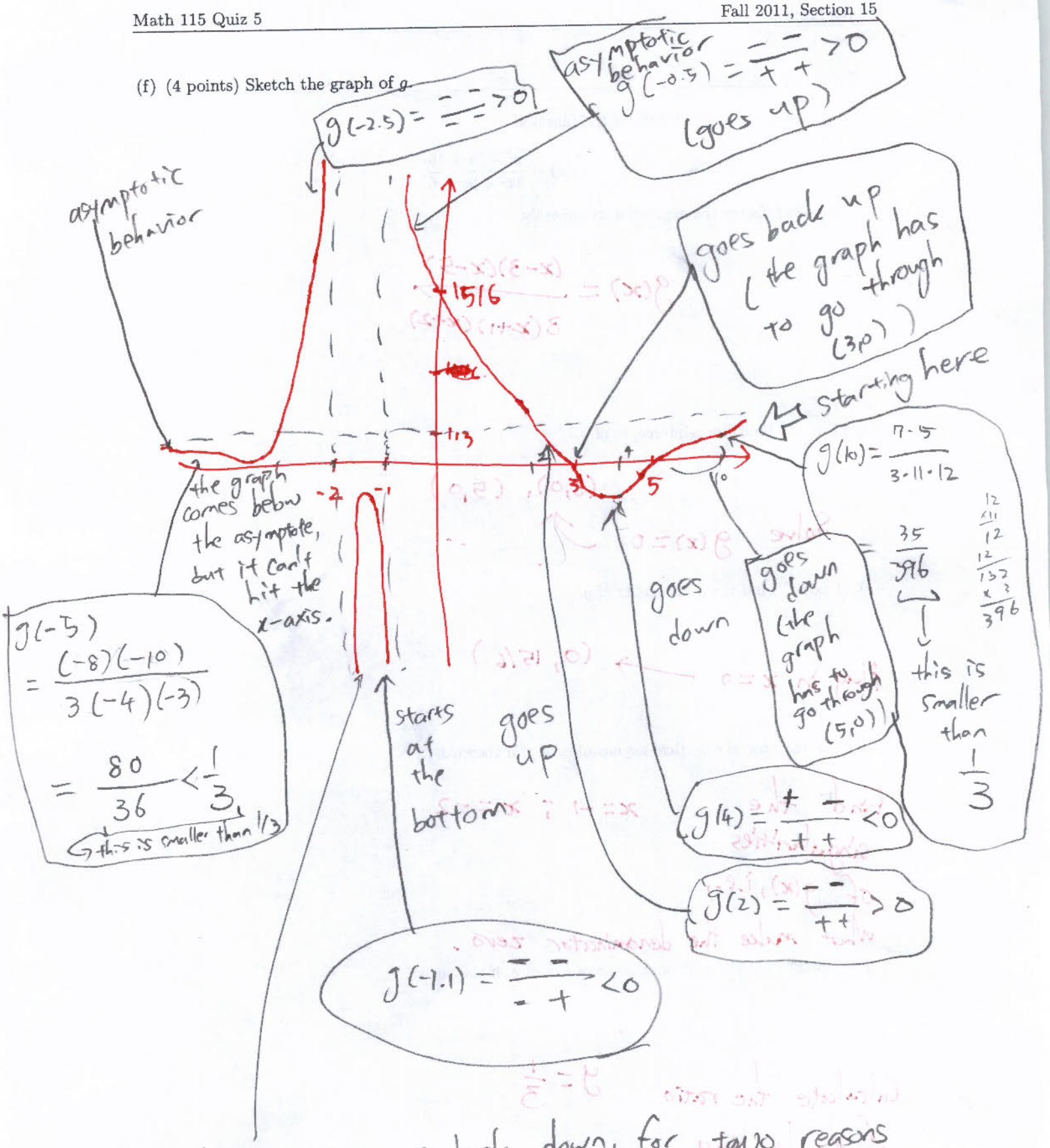
(d) (1 point) Find the vertical asymptotes of g, if they exist.

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

(f) (4 points) Sketch the graph of g.

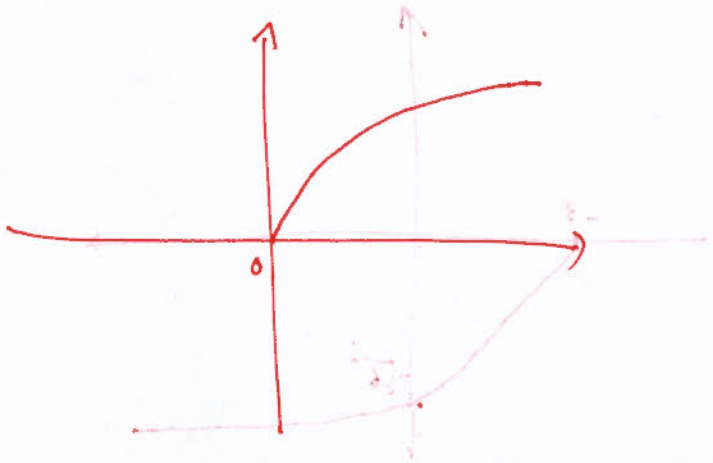


the graph has to come back down, for two reasons

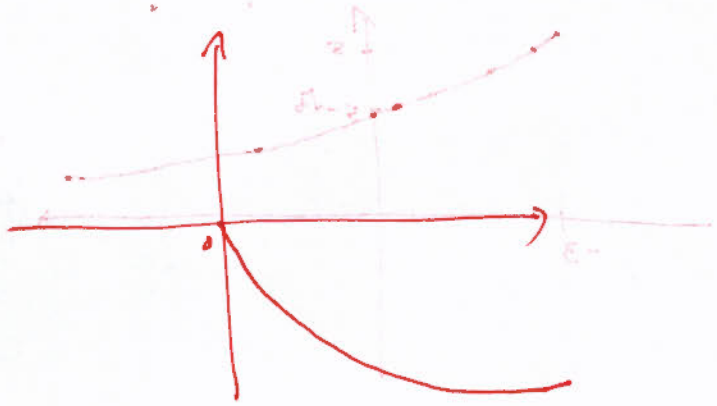
(1) $g(x) < 0$ for all $-1 < x < -2$ (Check?)

(2) there is no x-intercept there, and the asymptotic behavior must happen.

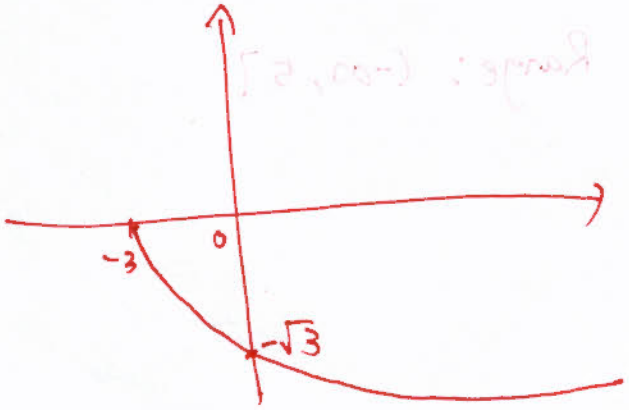
Problem 2 (10 points). (a) (1 point) Graph $f_0(x) = \sqrt{x}$.



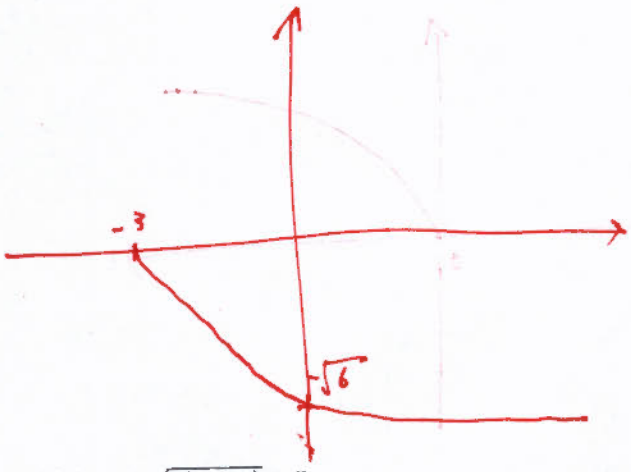
(b) (1 point) Graph $f_1(x) = -\sqrt{x}$.



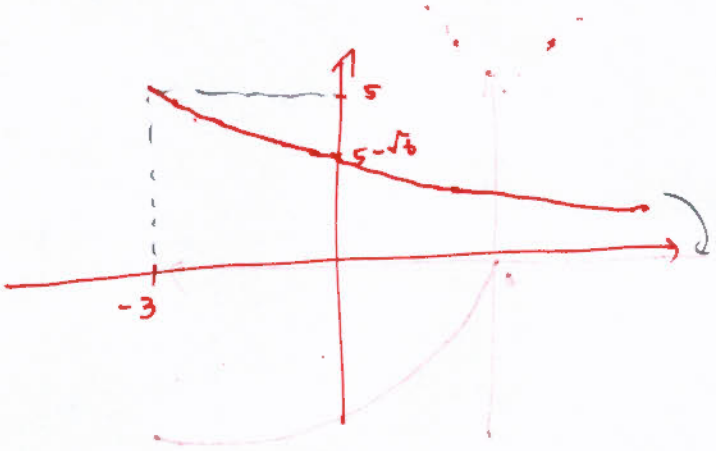
(c) (1 point) Graph $f_2(x) = -\sqrt{x+3}$.



(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: $(-\infty, 5]$