(a) If Q is the point $\left(x, \frac{3}{4-x}\right)$, find the slope of the secant line PQ (correct to six decimal places) for the following values of x.

$$m = \frac{y^2 - y^1}{x^2 - x^1}$$

x	$\frac{3}{4-x}$	
4.9	−3.3333333	3.33333
4.99	−3.030303	3.03 03
4.999	−3.003003	3.003
4.9999	−3.0003	3
5.0001	−2.9997	3
5.001	−2.997003	2.997
5.01	−2.970297	2.9703
5.1	−2.7272727	2.727

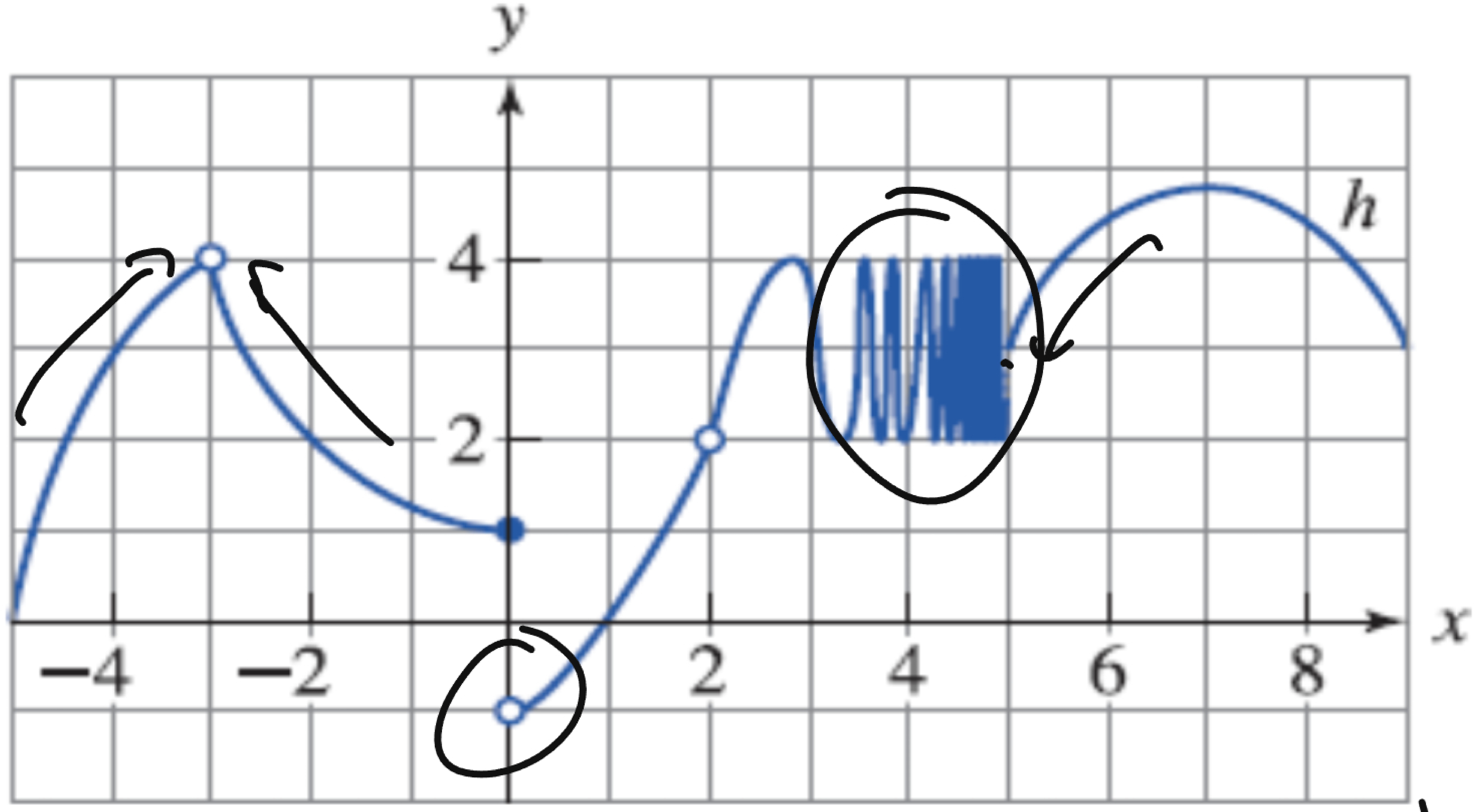
$$\lim_{x \to 5} m \to 3$$

$$y - y_1 = m(x - x_1)$$

$$y - (-3) = 3(x - 5)$$

$$y + 3 = 3x - 15$$

$$\boxed{y = 3x - 18}$$



$\lim_{x \to -3} h(x) = 4$

$\lim_{x \to -3^-} \to 4$ $\quad h(-3) = DNE$

$\lim_{x \to -3^+} \to 4$

$\lim_{x \to 0} h(x) = DNE$

$\lim_{x \to 0^-} h(x) = 1$ $\quad h(0) = 1$

$\lim_{x \to 0^+} h(x) = -1$

$\lim_{x \to 5^+} h(x) = 3$

$\lim_{x \to 5^-} h(x) = DNE$

$\lim_{x \to 5} h(x) = DNE$

Find $\lim_{x \to 0} \cos(x^3 + 3x)$

$\lim_{x \to 0}$

$\cos(0) = 1$

$\lim_{x \to \infty} \cos(x^3 + 3x) \to$ DNE

$\cos(\infty)$

$\cos\left(\lim_{x \to 0} x^3 + 3x\right)$

$$-1(-5+x)$$

$$\frac{9-(x+4)}{(x-5)(3+\sqrt{x+4})} = \frac{5-x}{(x-5)(3+\sqrt{x+4})}$$

$$\frac{-1\cancel{(x-5)}}{\cancel{(x-5)}(3+\sqrt{x+4})} = \frac{-1}{3+\sqrt{x+4}}$$

$$\lim_{x\to 5} \frac{-1}{3+\sqrt{x+4}} = \boxed{\frac{-1}{6}}$$

If $f(x) = \begin{cases} \sqrt{-x} \text{ if } x < 0 \\ 3 - x \text{ if } 0 \leq x < 3 \\ (x-3)^2 \text{ if } x > 3 \end{cases}$ find each of the following

a. $\lim_{x\to 0^+} f(x)$

b. $\lim_{x\to 0^-} f(x)$

c. $\lim_{x\to 0} f(x)$

d. $\lim_{x\to 3^+} f(x)$

e. $\lim_{x\to 3^-} f(x)$

f. $\lim_{x\to 3} f(x)$

a) $3 - x \to 3$

b) $\sqrt{-x} \to 0$

c) DNE

d) $(x-3)^2 \to 0$

e) $3 - x \to 0$

f) 0

Discontinous at $x=0$

$x=3$

$$\lim_{x \to 0} \frac{|8x - 7| - |8x + 7|}{x} \to$$

$$\lim_{x \to 0} |8x - 7| \qquad |8x + 7|$$

$$\lim_{x \to 0} \frac{-(8x - 7) - (8x + 7)}{x} = \frac{-8x + 7 - 8x - 7}{x}$$

$$= \frac{-16x}{x} = \boxed{-16}$$

$$\lim_{x \to 1} \frac{|8x - 7| - |8x + 7|}{x}$$

$8x - 7 < 0$

$8x < 7$

$x < 7/8$

$(8x-7) - (8x+7)$

$$\lim_{x \to 1} \frac{-14}{x} = -14$$

Find $\lim_{x\to 0^+} \tan^{-1}(\ln(x))$

$$\tan^{-1}\left(\lim_{x\to 0^+} \ln(x)\right)$$

$$\tan^{-1}(-\infty)$$

$$\frac{\sin^{-1}}{\cos^{-1}}$$

$$\frac{\pi}{2}, \frac{3\pi}{2}$$

$$-\frac{\pi}{2}$$

$$\overline{\quad} \; 0$$

$$\lim_{x\to 0^+} \ln(x) \to \boxed{\lim_{x\to -\infty} x}$$

$$\to -\infty$$

$$\tan^{-1}\left(\lim_{x\to\infty}(x)\right) \to \boxed{-\frac{\pi}{2}}$$

$$\lim_{x\to -\infty^+} \tan^{-1}(x)$$

Find $\lim\limits_{x\to-\infty} \dfrac{\left(\sqrt{1+4x^6}\right)/x^3}{\left(2-x^3\right)/x^3} \Rightarrow \dfrac{\sqrt{\dfrac{1}{x^6}+\dfrac{4x^6}{x^6}}}{\dfrac{2}{x^3}-\dfrac{x^3}{x^3}}$

$$\lim_{x\to-\infty} \frac{-\sqrt{1/x^6+4}}{2/x^3-1} = \frac{-\sqrt{4}}{-1} = \boxed{+2}$$

Find $\lim_{x\to\infty}(x-\sqrt{x})$

$$\lim_{x\to\infty}(x) - \lim_{x\to\infty}\sqrt{x}$$

$$\infty - \infty$$

$$\lim_{x\to\infty}\sqrt{x}(\sqrt{x}-1)$$

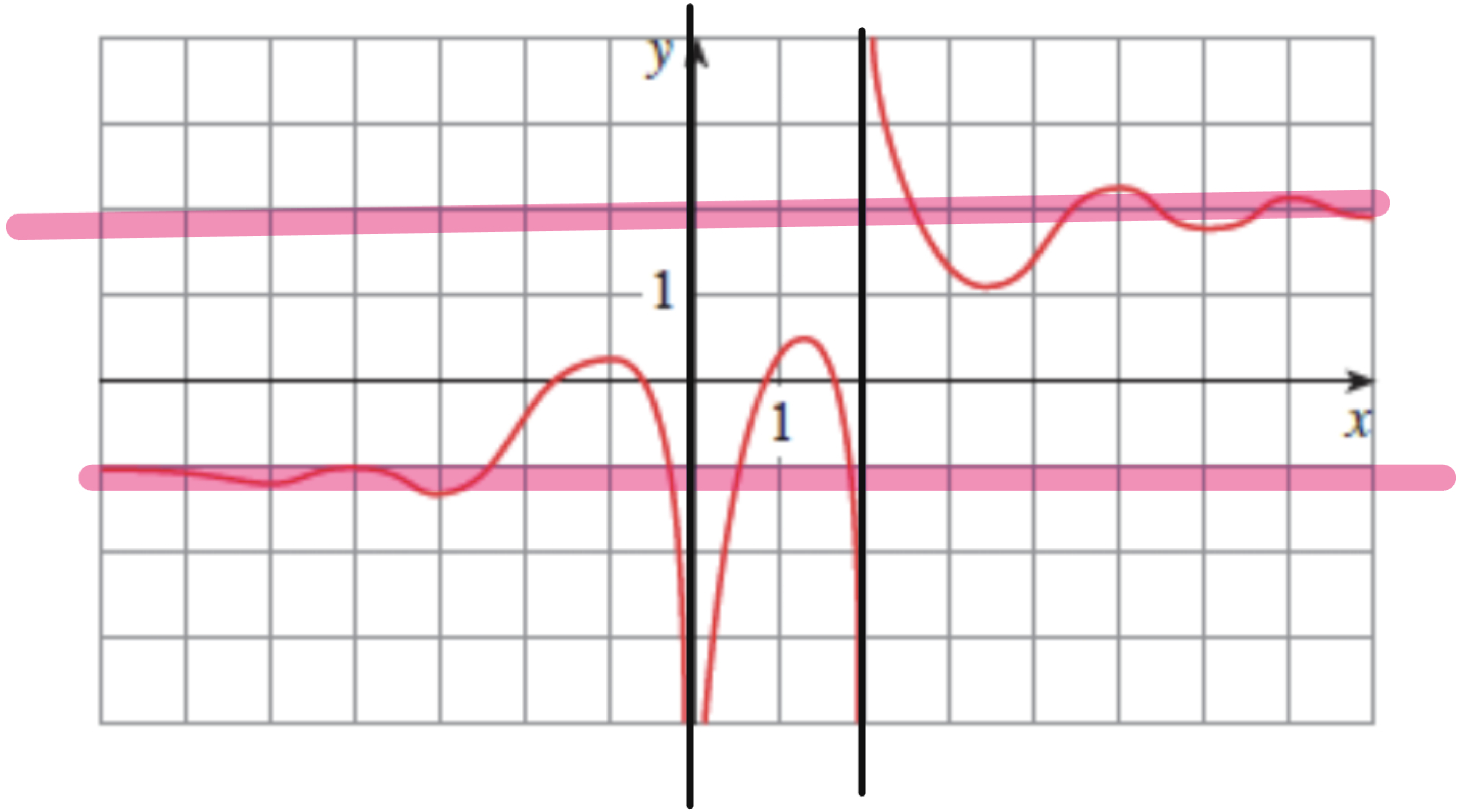
$$(\infty)(\infty) \to \infty$$

$$\lim_{x\to\infty} x^2 - x$$

$$\lim_{x\to\infty} x(x-1)$$

$$(\infty)(\infty)$$

$$\infty$$



(f) The equations of the asymptotes (Enter your answers as comma-separated lists.)

x = ✗ $2, 0$

y = ✗ $-1, 2$