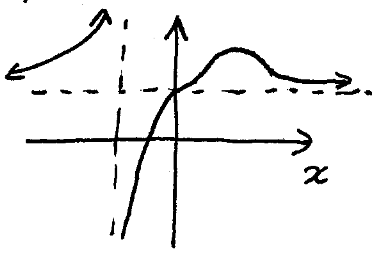
2-a) $y = f(x)$ cannot intersect a vertical asymptote because the function does not exist for that specific value.

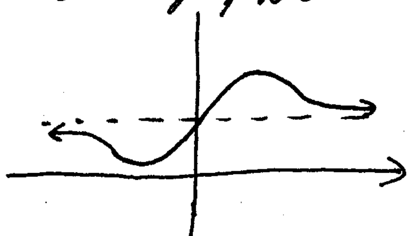
$y = f(x)$ can intersect a horizontal asymptote. Horizontal asymptote is for when $x \to +\infty$ and/or $x \to -\infty$.



"one possibility"

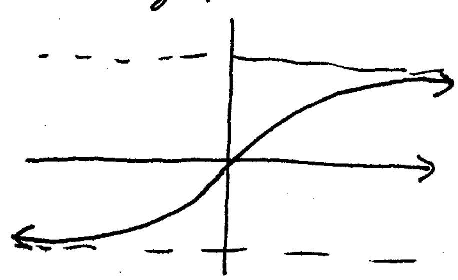
2-b) a graph can have 1 or 2 horizontal asymptotes

"one asymptote"



"one possibility"

two asymptote



"one possibility"

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4) a) $\lim_{x \to \infty} g(x) = 2$

b) $\lim_{x \to -\infty} g(x) = -2$

c) $\lim_{x \to 3} g(x) = +\infty$

d) $\lim_{x \to 0} g(x) = -\infty$

e) $\lim_{x \to 2^+} g(x) = 0.5$

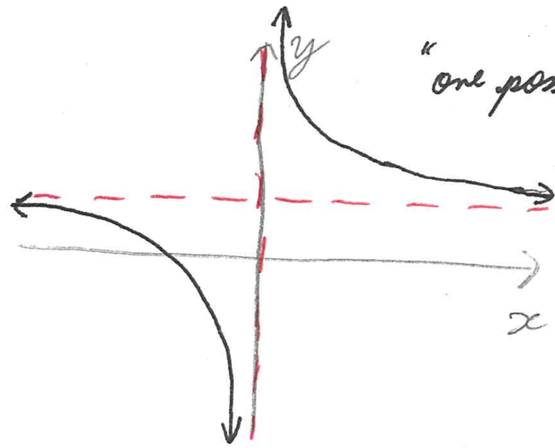
f) Vertical Asymptotes (V.A.): $x = -2, x = 0, x = 3$
Horizontal Asymptotes (H.A.): $y = -2, y = 2$

6) $\lim_{x \to 0^+} f(x) = \infty$

$\lim_{x \to 0^-} f(x) = -\infty$

$\lim_{x \to \infty} f(x) = 1$

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



"one possibility"

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12) $\lim_{x \to 4^-} \frac{3x}{x-4} = \frac{3(4^-)}{(4^-)-4} = \frac{12}{0^-} = \underline{\underline{-\infty}}$ because 0^- is less than 0 and negative value

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14) $\lim_{x \to 5^-} \frac{e^x}{(x-5)^3} = \frac{e^{(5^-)}}{((5^-)-5)^3} = \frac{e^5}{(0^-)^3} = \underline{\underline{-\infty}}$

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16) $\lim_{x \to 3^+} \ln(x^2-9) = \ln((3^+)^2-9) = \ln(9^+-9) = \ln(0^+) = \underline{\underline{-\infty}}$

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18) $\lim_{x \to \infty} \frac{\overset{+\infty}{3x+5}}{\underset{+\infty}{x-4}} = \lim_{x \to \infty} \frac{\frac{3x+5}{x}}{\frac{x-4}{x}} = \lim_{x \to \infty} \frac{\frac{3x}{x}+\frac{5}{x}}{\frac{x}{x}-\frac{4}{x}} = \lim_{x \to \infty} \frac{3+\frac{5}{x}}{1-\frac{4}{x}}$

$= \frac{3+0}{1-0} = \frac{3}{1} = \underline{\underline{3}}$

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20) $\lim_{x \to \infty} \frac{\overset{+\infty}{2x^2-1}}{\underset{+\infty}{4x^2-x}} = \lim_{x \to \infty} \frac{\frac{2x^2-1}{x^2}}{\frac{4x^2-x}{x^2}} = \lim_{x \to \infty} \frac{\frac{2x^2}{x^2}-\frac{1}{x^2}}{\frac{4x^2}{x^2}-\frac{x}{x^2}}$

$= \lim_{x \to \infty} \frac{2-\frac{1}{x^2}}{4-\frac{1}{x}} = \frac{2-0}{4-0} = \frac{2}{4} = \underline{\underline{\frac{1}{2}}}$

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22) $\lim_{t \to -\infty} \frac{\overset{+\infty}{t^2+2}}{\underset{-\infty}{t^3+t^2-1}} = \lim_{t \to -\infty} \frac{\frac{t^2+2}{t^3}}{\frac{t^3+t^2-1}{t^3}} = \lim_{t \to -\infty} \frac{\frac{t^2}{t^3}+\frac{2}{t^3}}{\frac{t^3}{t^3}+\frac{t^2}{t^3}-\frac{1}{t^3}} = \lim_{t \to -\infty} \frac{\frac{1}{t}+\frac{2}{t^3}}{1+\frac{1}{t}-\frac{1}{t^3}}$

$= \frac{0+0}{1+0-0} = \frac{0}{1} = \underline{\underline{0}}$

24) $\lim_{b \to -\infty} \sqrt[3]{b}\,(b-2) = \sqrt[3]{(-\infty)}\,((-\infty)-2) = \underline{\underline{+\infty}}$

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26) $\lim_{u \to \infty} (4u^3 - 2u^2) = \lim_{u \to \infty} 2u^2(2u-1) = 2(\infty)^2(2(\infty)-1) = \underline{\underline{+\infty}}$

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36)
$$\lim_{x \to \infty} \frac{\overset{+\infty}{x+3}}{\underset{+\infty}{\sqrt{4x^2+1}}} = \lim_{x \to \infty} \frac{\frac{x+3}{\sqrt{x^2}}}{\frac{\sqrt{4x^2+1}}{\sqrt{x^2}}} = \lim_{x \to \infty} \frac{\frac{x+3}{x}}{\sqrt{\frac{4x^2+1}{x^2}}}$$

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

$$= \frac{1+0}{\sqrt{4+0}} = \frac{1}{\sqrt{4}} = \underline{\underline{\frac{1}{2}}}$$