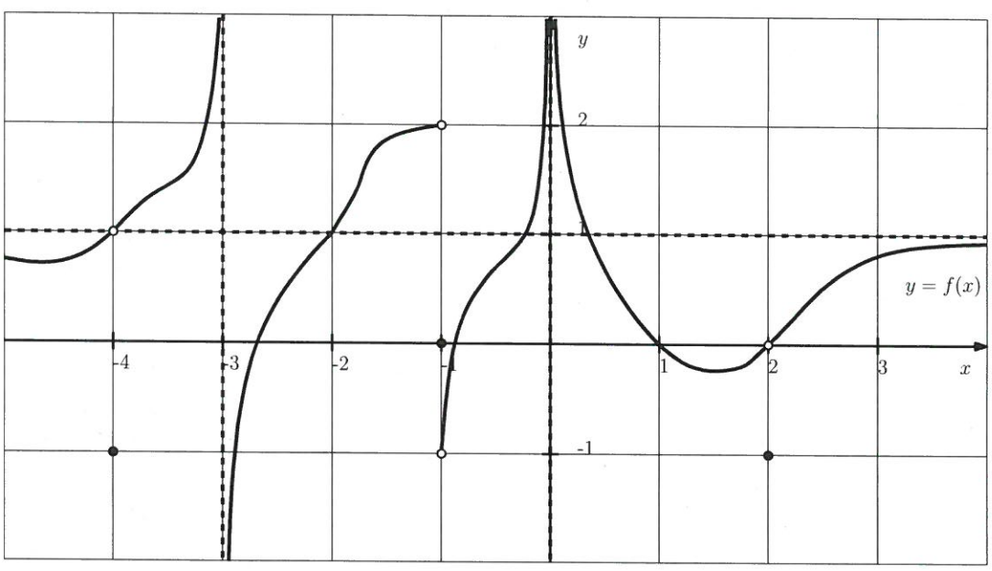
Math 1210: Quiz #3

Fall 2017

Name: Mine (solutions)	A#:	Section:

[6] 1. Let f be a function whose graph of $y = f(x)$ is given below.



Then

(a) $\lim_{z \to -4^-} f(z) =$ 1

(b) $\lim_{s \to -3^+} f(s) =$ $-\infty$

(c) $\lim_{z \to -1^-} f(z) =$ 2

(d) List all numbers a for which $\lim_{s \to a} f(s)$ does not exist: $-3, -1, 0$

(e) List all horizontal asymptotes: $y = 1$

(f) List all vertical asymptotes: $x = -3, x = 0$

[2] 2. List all vertical asymptotes of $y = \dfrac{(x+2)^3(x-3)^2 \ln|x|}{(x+3)^2(x+2)^2(x-3)^3}$: $x = 3, x = 0, x = -3$

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[2] 1.

(a) List vertical asymptotes of

$$y = \frac{x^2 + 3x - 10}{x^2 - 4} + \ln|x^2 - x|.$$

$= \frac{(x+5)(x-2)}{(x+2)(x-2)} + \ln|x| + \ln|x-1|$

Hence vertical asymptote at $x = 0$ and $x = +1$, and $x = -2$

(b) List horizontal asymptotes of $y = \tan^{-1}(x)$.

Since $\lim_{x\to+\infty} \tan^{-1} x = \pi/2$

and $\lim_{x\to-\infty} \tan^{-1} x = -\pi/2$, the horizontal asymptotes of $\tan^{-1} x$ are at $y = \pm\pi/2$

[6] 2. Find horizontal asymptotes of $y = \dfrac{1 - 3x}{\sqrt{x^2 - x + 3}}$

Since $\lim_{x\to+\infty} y = \lim_{x\to+\infty} \frac{1-3x}{x\sqrt{1 - 1/x + 3/x^2}} = \lim_{x\to+\infty} \frac{-3x}{x} = -3$

and $\lim_{x\to-\infty} y = \lim_{x\to-\infty} \frac{1-3x}{-x\sqrt{1 - 1/x + 3/x^2}} = \lim_{x\to-\infty} \frac{-3x}{-x} = +3$

Hence the horizontal asymptotes of y are $y = \pm 3$