Math 1210: Worksheet #3 **Fall 2017**

Name: SOLUTION	A#:	Section: A, B

[2] 1.

(a) List vertical asymptotes of

$$y = \frac{x^2+3x-10}{x^2-4} + \ln|x^2-x| = \frac{(x-2)(x+5)}{(x-2)(x+2)} + \ln|x(x-1)|$$

V.a.: $x=-2,\ x=0,\ x=1$

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

H.a: $y=\frac{\pi}{2},\ y=-\frac{\pi}{2}$

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

$$\lim_{x\to\infty} \frac{1-3x}{\sqrt{x^2-x+3}} = \lim_{x\to\infty} \frac{\frac{1}{x}-3}{\sqrt{1-\frac{1}{x}+\frac{3}{x^2}}} = \frac{0-3}{\sqrt{1-0+0}} = \boxed{-3}$$

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

H.a.: $\boxed{y=-3}$ and $\boxed{y=3}$

[12] 3. Compute the limits (as a number, as ∞ , as $-\infty$, or as 'does not exist'; whichever is most precise).

(a) $\lim_{x\to 1^+} \frac{x-2}{x^2+2x-3} = \lim_{x\to 1^+} \frac{\overset{\to -1}{x-2}}{\underset{\to 4}{(x+3)}\underset{\to 0^+}{(x-1)}} = \lim_{x\to 1^+} \frac{-1}{4(x-1)} = \boxed{-\infty}$

(b) $\lim_{x\to 0} \frac{2\sin x}{x} + \lim_{t\to -\infty} \frac{\sin t}{2t} + \lim_{s\to \frac{\pi}{6}} \frac{\sin s}{s} = 2\cdot 1 + 0 + \frac{\sin(\pi/6)}{\frac{\pi}{6}} = \boxed{2+\frac{3}{\pi}}$

(c) $\lim_{x\to\infty} \left(e^x - \sqrt{e^{2x}-e^x+1}\right) = \lim_{x\to\infty} \frac{(e^x - \sqrt{e^{2x}-e^x+1})(e^x+\sqrt{e^{2x}-e^x+1})}{e^x+\sqrt{e^{2x}-e^x+1}}$

$= \lim_{x\to\infty} \frac{e^{2x}-(e^{2x}-e^x+1)}{e^x+\sqrt{e^{2x}-e^x+1}} = \lim_{x\to\infty} \frac{e^x-1}{e^x+\sqrt{e^{2x}-e^x+1}} = \lim_{x\to\infty} \frac{1-e^{-x}}{1+\sqrt{1-e^{-x}+e^{-2x}}}$

$= \frac{1-0}{1+\sqrt{1-0+0}} = \boxed{\frac{1}{2}}$

(d) $\lim_{x\to -\infty} \left(x^3 - 3x + 2e^{+x}\right) = \lim_{x\to -\infty} x^3\left(1 - \overset{\to 0}{\frac{3}{x^2}} + \overset{\to 0}{\frac{2e^{+x}}{x^3}}\right) = \boxed{-\infty}$

v3.AB