Name: Richard

QUIZ 4 ♡

MATH 200

September 13, 2021

1. $\lim_{x\to 0} \frac{x^2+2x-24}{x^2-5x+4} = \frac{0^2+2\cdot 0-24}{0^2-5\cdot 0+4} = \frac{-24}{4} = \boxed{-6}$

2. $\lim_{x\to \infty} \frac{x^2+2x-24}{x^2-5x+4} = \lim_{x\to\infty} \frac{x^2+2x-24}{x^2-5x+4}\,\frac{\frac{1}{x^2}}{\frac{1}{x^2}} = \lim_{x\to\infty} \frac{1+\frac{2}{x}-\frac{24}{x^2}}{1-\frac{5}{x}+\frac{4}{x^2}} = \frac{1+0-0}{1-0+0}$

$= \boxed{1}$

3. $\lim_{x\to 4} \frac{x^2+2x-24}{x^2-5x+4} = \lim_{x\to 4} \frac{(x-4)(x+6)}{(x-4)(x-1)} = \lim_{x\to 4} \frac{x+6}{x-1} = \frac{4+6}{4-1} = \boxed{\frac{10}{3}}$

getting $\frac{0}{0}$

approaching 7

4. $\lim_{x\to 1^+} \frac{x^2+2x-24}{x^2-5x+4} = \lim_{x\to 1^+} \frac{(x-4)(x+6)}{(x-4)(x-1)} = \lim_{x\to 1^+} \frac{x+6}{x-1} = \boxed{\infty}$

getting $\frac{-21}{0}$

$1 \leftarrow x$

approaching zero, pos.

5. $\lim_{x\to\infty} \tan^{-1}\left(\frac{1}{x}\right) = \tan^{-1}\left(\lim_{x\to\infty} \frac{1}{x}\right) = \tan^{-1}(0) = \boxed{0}$

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Quiz 4 ♣

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1. $\lim\limits_{x\to 1} \dfrac{4x^2-4}{x^2-11x+10} =$ $\lim\limits_{x\to 1} \dfrac{4(x^2-1)}{(x-1)(x-10)} = \lim\limits_{x\to 1} \dfrac{4\cancel{(x-1)}(x+1)}{\cancel{(x-1)}(x-10)}$

getting $\frac{0}{0}$

$= \lim\limits_{x\to 1} \dfrac{4(x+1)}{x-10} = \dfrac{4(1+1)}{1-10} = \boxed{-\dfrac{8}{9}}$

2. $\lim\limits_{x\to \infty} \dfrac{4x^2-4}{x^2-11x+10} =$ $\lim\limits_{x\to\infty} \dfrac{4x^2-4}{x^2-11x+10} \, \dfrac{\frac{1}{x^2}}{\frac{1}{x^2}} = \lim\limits_{x\to\infty} \dfrac{4-\frac{4}{x^2}}{1-\frac{11}{x}+\frac{10}{x^2}}$

$= \dfrac{4-0}{1-0+0} = \boxed{4}$

3. $\lim\limits_{x\to 0} \dfrac{4x^2-4}{x^2-11x+10} =$ $\dfrac{4\cdot 0^2-4}{0^2-11\cdot 0+10} = \dfrac{-4}{10} = \boxed{-\dfrac{2}{5}}$

4. $\lim\limits_{x\to 10^+} \dfrac{4x^2-4}{x^2-11x+10} =$ $\lim\limits_{x\to 10^+} \dfrac{4(x-1)(x+1)}{(x-1)(x-10)} = \lim\limits_{x\to 10^+} \dfrac{4(x+1)}{x-10} = \boxed{\infty}$

approaches 44

getting $\dfrac{400-4}{0} = \dfrac{396}{0}$ ← Expect $\pm\infty$

approaching 0 and positive

5. $\lim\limits_{x\to 0^+} \tan^{-1}\left(\dfrac{1}{x}\right) = \boxed{\dfrac{\pi}{2}}$

as x approaches 0 from the right $\frac{1}{x}$ approaches ∞, so $\tan^{-1}\left(\frac{1}{x}\right)$ approaches $\frac{\pi}{2}$

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QUIZ 4 ♠

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1. $\lim_{x\to 0} \frac{x^2-11x+10}{4x^2-4} = \frac{0^2-11\cdot 0+10}{4\cdot 0^2-4} = \frac{10}{-4} = \boxed{-\frac{5}{2}}$

2. $\lim_{x\to\infty} \frac{x^2-11x+10}{4x^2-4} = \lim_{x\to\infty} \frac{x^2-11x+10}{4x^2-4} \cdot \frac{\frac{1}{x^2}}{\frac{1}{x^2}} = \lim_{x\to\infty} \frac{1-\frac{11}{x}+\frac{10}{x^2}}{4-\frac{4}{x^2}}$

$= \frac{1-0+0}{4-0} = \boxed{\frac{1}{4}}$

3. $\lim_{x\to 1} \frac{x^2-11x+10}{4x^2-4} = \lim_{x\to 1} \frac{(x-1)(x-10)}{4(x^2-1)} = \lim_{x\to 1} \frac{(x-1)(x-10)}{4(x-1)(x+1)}$

getting $\frac{0}{0}$

$= \lim_{x\to 1} \frac{x-10}{4(x+1)} = \frac{1-10}{4(1+1)} = \boxed{-\frac{9}{8}}$

4. $\lim_{x\to -1^+} \frac{x^2-11x+10}{4x^2-4} = \lim_{x\to -1^+} \frac{x-10}{4(x+1)} = \boxed{-\infty}$

approaching -11

getting $\frac{22}{0}$

factor and cancel as above

approaching $4\cdot 0 = 0$, pos

$-1 \leftarrow x$

5. $\lim_{x\to\infty} e^{1/x} = \lim_{x\to\infty} e^{\frac{1}{x}} = e^{\lim_{x\to\infty}\frac{1}{x}} = e^0 = \boxed{1}$

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Quiz 4 ♢

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1. $\lim_{x\to 4} \frac{x^2-5x+4}{x^2+2x-24} = \lim_{x\to 4} \frac{\cancel{(x-4)}(x-1)}{\cancel{(x-4)}(x+6)} = \lim_{x\to 4} \frac{x-1}{x+6} = \frac{4-1}{4+6} = \boxed{\frac{3}{10}}$

getting $\frac{0}{0}$

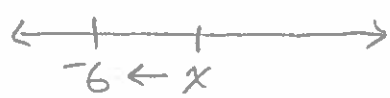
2. $\lim_{x\to \infty} \frac{x^2-5x+4}{x^2+2x-24} = \lim_{x\to\infty} \frac{x^2-5x+4}{x^2+2x-24} \frac{\frac{1}{x^2}}{\frac{1}{x^2}} = \lim_{x\to\infty} \frac{1-\frac{5}{x}+\frac{4}{x^2}}{1+\frac{2}{x}-\frac{24}{x^2}}$

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

3. $\lim_{x\to 0} \frac{x^2-5x+4}{x^2+2x-24} = \frac{0^2-5\cdot 0+4}{0^2+2\cdot 0-24} = \frac{4}{-24} = \boxed{-\frac{1}{6}}$

approaching -7

4. $\lim_{x\to -6^+} \frac{x^2-5x+4}{x^2+2x-24} = \lim_{x\to -6^+} \frac{(x-4)(x-1)}{(x-4)(x+6)} = \lim_{x\to -6^+} \frac{x-1}{x+6} = \boxed{-\infty}$



approaching 0 and positive

5. $\lim_{x\to -\infty} e^x = \boxed{0}$