Name: Richard | Quiz 20 ♡ | MATH 200

November 16, 2022

1. $\lim\limits_{x\to 0} \dfrac{e^x - e^{-x}}{\sin(x)} = \lim\limits_{x\to 0} \dfrac{e^x - e^{-x}(-1)}{\cos(x)} = \lim\limits_{x\to 0} \dfrac{e^x + e^{-x}}{\cos(0)} = \dfrac{e^0 + e^{-0}}{1}$

form $\frac{0}{0}$

$= \dfrac{1+1}{1} = \boxed{2}$

2. $\lim\limits_{x\to 0} \dfrac{2 - \ln|x^2|}{1 + \ln|x^3|} = \lim\limits_{x\to 0} \dfrac{0 - \frac{2x}{x^2}}{0 + \frac{3x^2}{x^3}} = \lim\limits_{x\to 0} \dfrac{-\frac{2}{x}}{\frac{3}{x}} = \lim\limits_{x\to 0} -\dfrac{2}{3} = \boxed{-\dfrac{2}{3}}$

form $\frac{\infty}{\infty}$

3. $\lim\limits_{x\to 0} x^2 \ln|x| = \lim\limits_{x\to 0} \dfrac{\ln|x|}{\frac{1}{x^2}} = \lim\limits_{x\to 0} \dfrac{\frac{1}{x}}{\frac{-2}{x^3}} = \lim\limits_{x\to 0} \dfrac{1}{x}\cdot\dfrac{-x^3}{2}$

form $0 \cdot \infty$

form $\frac{\infty}{\infty}$

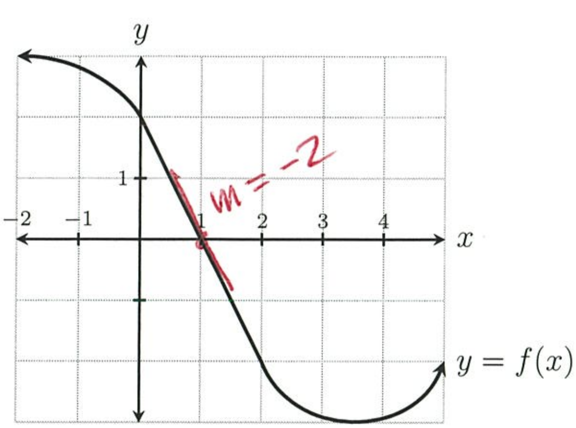
$= \lim\limits_{x\to 0} \dfrac{-x^2}{2} = \dfrac{-0^2}{2} = \boxed{0}$

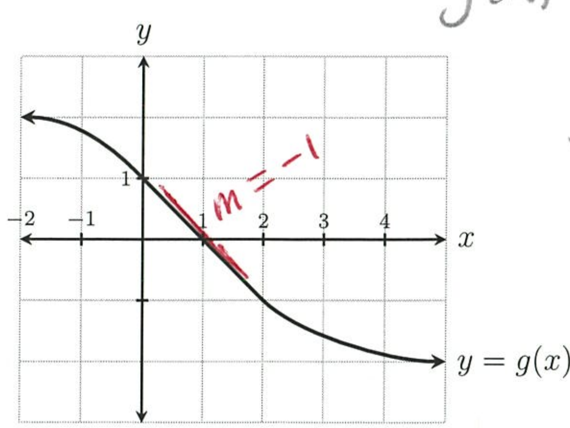
form $\frac{0}{0}$

4. Given the functions $f(x)$ and $g(x)$ graphed below, find $\lim\limits_{x\to 1} \dfrac{f(x)}{g(x)} = \lim\limits_{x\to 1} \dfrac{f'(x)}{g'(x)} = \dfrac{f'(1)}{g'(1)}$

$= \dfrac{-2}{-1}$

$= \boxed{2}$





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QUIZ 20 ♣

MATH 200
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1. $\lim_{x\to 1} \dfrac{1-x}{\ln|x|} = \lim_{x\to 1} \dfrac{-1}{1/x} = \dfrac{-1}{1/1} = \boxed{-1}$

form $\frac{0}{0}$

2. $\lim_{x\to 0^+} \sin(x)\ln(x) = \lim_{x\to 0^+} \dfrac{\ln(x)}{\frac{1}{\sin(x)}} = \lim_{x\to 0^+} \dfrac{\ln(x)}{\csc(x)} = \lim_{x\to 0^+} \dfrac{\frac{1}{x}}{-\csc(x)\cot(x)}$

form $0\cdot\infty$

form $\frac{0}{0}$

$= \lim_{x\to 0} \dfrac{\frac{1}{x}}{\frac{-1}{\sin(x)}\frac{\cos(x)}{\sin(x)}} = \lim_{x\to 0} \dfrac{-\sin(x)}{x}\dfrac{\sin(x)}{\cos(x)} = -1\cdot\dfrac{\sin(0)}{\cos(0)} = \dfrac{-1\cdot 0}{1}$

$= \boxed{0}$

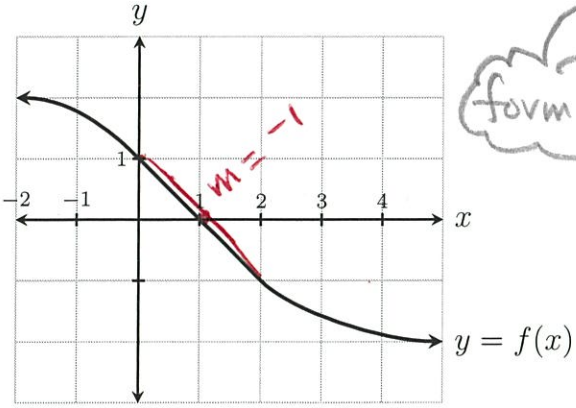
3. $\lim_{x\to\infty} \dfrac{5x^2+e^x}{x^2-6+5e^x} = \lim_{x\to\infty} \dfrac{10x+e^x}{2x+5e^x} = \lim_{x\to\infty} \dfrac{10+e^x}{2+5e^x}$

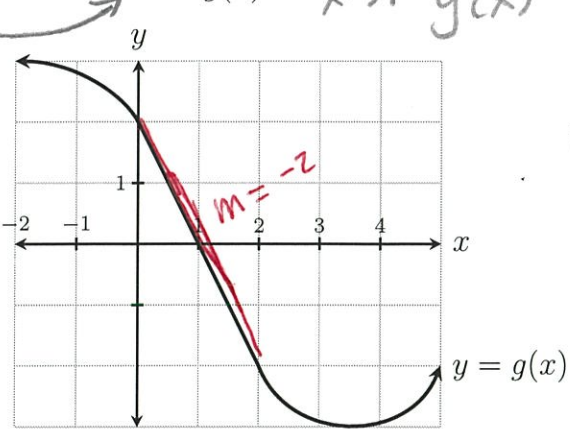
form $\frac{\infty}{\infty}$ form $\frac{\infty}{\infty}$ form $\frac{\infty}{\infty}$ $= \lim_{x\to\infty} \dfrac{e^x}{5e^x}$

$= \lim_{x\to\infty} \dfrac{1}{5} = \boxed{\dfrac{1}{5}}$

4. Given the functions $f(x)$ and $g(x)$ graphed below, find $\lim_{x\to 1} \dfrac{f(x)}{g(x)} = \lim_{x\to 1} \dfrac{f'(x)}{g'(x)} = \dfrac{f'(1)}{g'(1)}$

form $\frac{0}{0}$





$= \dfrac{-1}{-2}$

$= \boxed{\dfrac{1}{2}}$

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Quiz 20 ◇

MATH 200
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1. $\lim\limits_{x\to 1} \dfrac{\sin(\pi x - \pi)}{4-4x} = \lim\limits_{x\to 1} \dfrac{\cos(\pi x - \pi)\,\pi}{0-4} = \dfrac{\cos(\pi\cdot 1 - \pi)\,\pi}{-4}$

form $\frac{0}{0}$

$= \dfrac{\cos(0)\,\pi}{-4} = \dfrac{1\cdot\pi}{-4} = \boxed{-\dfrac{\pi}{4}}$

2. $\lim\limits_{x\to\infty} xe^{-x} = \lim\limits_{x\to\infty} \dfrac{x}{1/e^{-x}} = \lim\limits_{x\to\infty} \dfrac{x}{e^{x}} = \lim\limits_{x\to\infty} \dfrac{1}{e^{x}} = \boxed{0}$

form $\infty\cdot 0$

form $\frac{\infty}{\infty}$

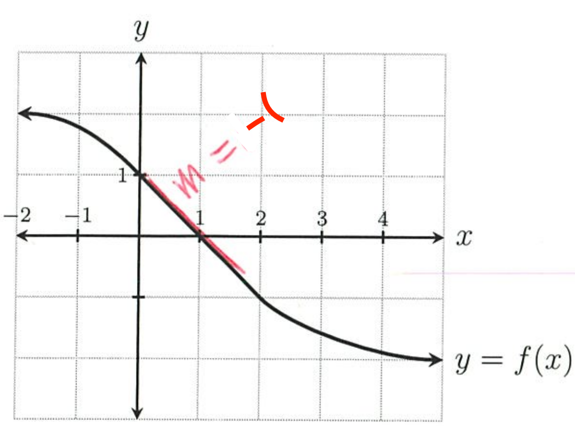
3. $\lim\limits_{x\to\infty} \dfrac{e^x}{1+\ln(x)} = \lim\limits_{x\to\infty} \dfrac{e^x}{0+\frac{1}{x}} = \lim\limits_{x\to\infty} \dfrac{e^x}{\frac{1}{x}}$

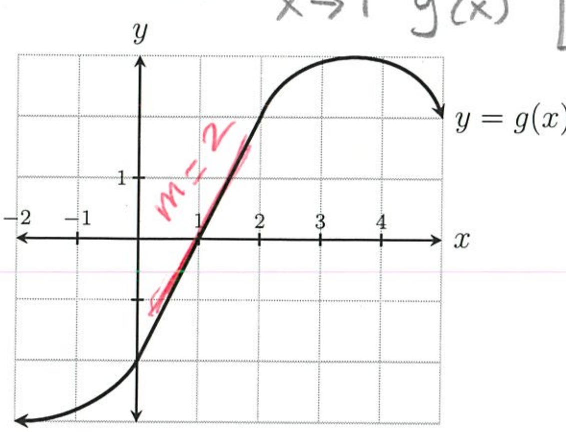
form $\frac{\infty}{\infty}$

$= \lim\limits_{x\to\infty} xe^{x} = \boxed{\infty}$

form $\frac{0}{0}$

4. Given the functions $f(x)$ and $g(x)$ graphed below, find $\lim\limits_{x\to 1} \dfrac{f(x)}{g(x)} = \lim\limits_{x\to 1} \dfrac{f'(x)}{g'(x)} = \boxed{\dfrac{-1}{2}}$





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Quiz 20 ♠

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1. $\lim\limits_{x\to 0} \dfrac{\cos(x)-1}{x^2} = \lim\limits_{x\to 0} \dfrac{-\sin(x)}{2x} = \lim\limits_{x\to 0} \dfrac{-\cos(x)}{2} = \dfrac{-\cos(0)}{2} = \boxed{-\dfrac{1}{2}}$

form $\frac{0}{0}$

form $\frac{0}{0}$

2. $\lim\limits_{x\to 0} x\ln|x| = \lim\limits_{x\to 0} \dfrac{\ln|x|}{1/x} = \lim\limits_{x\to 0} \dfrac{\frac{1}{x}}{-\frac{1}{x^2}} = \lim\limits_{x\to 0} \dfrac{1}{x}\cdot\dfrac{-x^2}{1}$

form $0\cdot\infty$

form $\frac{\infty}{\infty}$

$= \lim\limits_{x\to 0}(-x) = \boxed{0}$

3. $\lim\limits_{x\to\infty} \dfrac{\ln(x)}{e^x} = \lim\limits_{x\to\infty} \dfrac{\frac{1}{x}}{e^x} = \lim\limits_{x\to\infty} \dfrac{1}{xe^x} = \boxed{0}$

form $\frac{\infty}{\infty}$

approaching ∞

form $\frac{0}{0}$

4. Given the functions $f(x)$ and $g(x)$ graphed below, find $\lim\limits_{x\to 1} \dfrac{f(x)}{g(x)} = \lim\limits_{x\to 1} \dfrac{f'(x)}{g'(x)} = \dfrac{2}{-1}$

$= \boxed{-2}$