9.2 L'Hopital's Rule

HW: 1-8 all

$$\lim_{x\to -2} \frac{2x}{1} = -2(-2) = 4$$

$$\lim_{x\to -2} \frac{(x-2)(x+2)}{x+2} = \lim_{x\to -2} -(x-2) = -(-2-2) = -(-4) = 4$$

Example 1: $\lim_{x\to 0} \frac{\sin 3x}{x}$

$$\lim_{x\to 0} \frac{3\cos(3x)}{1} = 3\cos(0) = 3 \cdot 1 = 3$$

Example 2: $\lim_{t\to 1} \frac{t-1}{\sqrt{t}-1}$

$\sqrt{t} = t^{1/2}$

$\lim_{t\to 1} \frac{1}{\frac{1}{2}t^{-1/2}}$

$\lim_{t\to 1} \frac{1}{\frac{1}{2\sqrt{t}}}$ $\frac{2\sqrt{t}}{2\sqrt{t}}$

$\lim_{t\to 1} 2\sqrt{t}$

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

Example 3: $\lim_{t\to 1} \frac{t-1}{\ln(t)-\sin(\pi t)}$

$\lim_{t\to 1} \frac{1}{\frac{1}{t}-\cos(\pi t)\cdot\pi}$

$\frac{1}{1-\pi\cos\pi} \Rightarrow \frac{1}{1-\pi(-1)}$

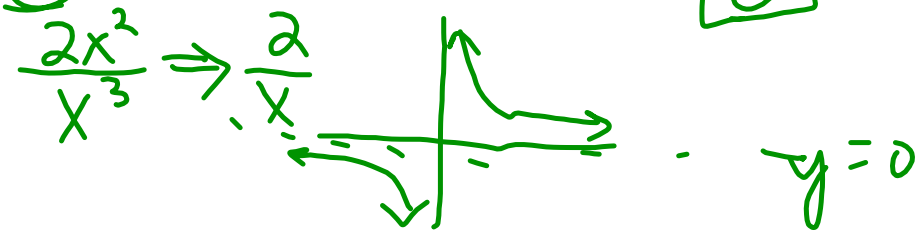
$\boxed{\frac{1}{1+\pi}}$

Example 4: $\lim_{x\to\infty} \frac{2x^3+3x}{x^3+x+1}$

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

Example 5: $\lim_{x\to\infty} \frac{2x^2+3x}{x^3+x+1}$

$\frac{2x^2}{x^3} \Rightarrow \frac{2}{x}$



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Example 6: $\lim_{x\to\infty} \frac{2x^2+3x}{x^3+x+1}$ $\boxed{0}$