201-SH3-AB - Exercises #1: l'Hospital's Rule

Evaluate the following limits, using l'Hospital's rule where appropriate.

(1) $\lim\limits_{x\to\infty} \dfrac{2x^3+\sqrt{x}}{3-5x^3}$

(2) $\lim\limits_{x\to 0} \dfrac{e^{-3x}+x^3-1}{1-e^{5x}}$

(3) $\lim\limits_{x\to 0} \dfrac{e^x-x^2-1}{\sin(2x)}$

(4) $\lim\limits_{x\to 0} \dfrac{e^x-x^3-1}{\sin\left(\frac{x}{2}\right)}$

(5) $\lim\limits_{x\to\infty} \dfrac{4e^{3x}-x^2}{1+x+6e^{3x}}$

(6) $\lim\limits_{x\to\infty} \dfrac{e^{2/x}-3x^2}{4x^2-e^{3/x}}$

(7) $\lim\limits_{x\to 2} \dfrac{\cos(x-2)+2x-5}{x-4+2e^{x-2}}$

(8) $\lim\limits_{x\to 0} \dfrac{6x^3-5x}{e^x-1}$

(9) $\lim\limits_{x\to -2} \dfrac{3x^3+11x^2+8x-4}{5x^3+21x^2+24x+4}$

(10) $\lim\limits_{x\to 3} \dfrac{x^2-4x+5}{3x^2-5x+2}$

(11) $\lim\limits_{x\to\infty} \dfrac{(3x-4)^3}{9x^2-5x^3}$

(12) $\lim\limits_{x\to 2^+} \dfrac{2-x-e^{x-2}}{x^2-4}$

(13) $\lim\limits_{x\to 0} \dfrac{x^2-e^{2x}+\cos(x)}{3x^2+\sin(3x)}$

(14) $\lim\limits_{x\to -1} \dfrac{x^3+x^2+4x+4}{x^3+3x^2+6x+4}$

(15) $\lim\limits_{x\to\infty} \dfrac{\sqrt{4x^2+3}}{9-x}$

(16) $\lim\limits_{x\to 0} \dfrac{4x+1-e^{2x}}{4e^{3x}-4}$

(17) $\lim\limits_{x\to 0} \dfrac{\tan(x)}{e^x+1}$

(18) $\lim\limits_{x\to -\infty} \dfrac{x^2-e^{3x}}{e^{2x}+3x^2}$

(19) $\lim\limits_{x\to\infty} \dfrac{(2x-1)^3}{(4x+1)^3}$

ANSWERS:

(1) $-2/5$

(2) $3/5$

(3) $1/2$

(4) 2

(5) $2/3$

(6) $-3/4$

(7) $2/3$

(8) -5

(9) $7/9$

(10) $1/7$

(11) $-27/5$

(12) $-\infty$

(13) $-2/3$

(14) $5/3$

(15) -2

(16) $1/6$

(17) 0

(18) $1/3$

(19) $1/8$