Evaluation Formative 1

a) $$\lim_{x\to 3} \frac{\sqrt{x}-\sqrt{3}}{27-x^3} \overset{\frac{0}{0}}{\underset{Hosp}{=}} \lim_{x\to 3} \frac{\frac{1}{2\sqrt{x}}}{-3x^2} = \lim_{x\to 3} \frac{1}{2\sqrt{x}} \cdot \frac{1}{-3x^2}$$

$$= \frac{1}{2\sqrt{3}} \cdot \frac{1}{-3\cdot 9} = -\frac{1}{54\sqrt{3}}$$

b) $$\lim_{x\to 0} \frac{4x^2}{3x+1-e^{3x}} \overset{\frac{0}{0}}{\underset{Hosp}{=}} \lim_{x\to 0} \frac{8x}{3+0-e^{3x}\cdot 3} \overset{\frac{0}{0}}{\underset{Hosp}{=}}$$

$$\lim_{x\to 0} \frac{8}{-e^{3x}\cdot 3\cdot 3} = \frac{8}{-9} = -\frac{8}{9}$$

c) $$\lim_{x\to 0} \frac{x^2-\cos(2x)+1}{3x^2} \overset{\frac{0}{0}}{\underset{Hosp}{=}} \lim_{x\to 0} \frac{2x+\sin(2x)\cdot 2}{6x}$$

$$\overset{\frac{0}{0}}{\underset{Hosp}{=}} \lim_{x\to 0} \frac{2+\cos(2x)\cdot 2\cdot 2}{6} = \frac{2+4}{6} = 1$$

d) $$\lim_{x\to 0} \frac{(e^{3x}-1)\cdot(e^{4x}+1)}{\ln(2x+1)\cdot(1-5x)} \overset{\frac{(1+1)\cdot(1+1)}{0\cdot(1-0)}}{=}$$ on sépare en 2 limites

$$= \underbrace{\lim_{x\to 0} \frac{e^{3x}-1}{\ln(2x+1)}}_{\text{partie indéterminée}} \cdot \underbrace{\lim_{x\to 0} \frac{e^{4x}+1}{1-5x}}_{\text{partie déterminée}} \overset{\frac{0}{0}}{\underset{Hosp}{=}}$$

$$= \lim_{x\to 0} \frac{e^{3x}\cdot 3}{\frac{1}{2x+1}\cdot 2} \cdot \underbrace{\frac{e^0+1}{1-0}}_{=\frac{2}{1}=2} \text{ puis } \overset{\frac{0}{0}}{=} \frac{e^0\cdot 3}{\frac{1}{2\cdot 0+1}\cdot 2}\cdot 2 = 3$$

e) $$\lim_{x\to+\infty} \frac{1-5\ln(x)}{4x^2-1} \overset{\frac{-\infty}{+\infty}}{\underset{Hosp}{=}} \lim_{x\to+\infty} \frac{-\frac{5}{x}}{8x} = \lim_{x\to+\infty} -\frac{5}{x}\cdot\frac{1}{8x}$$

$$= \lim_{x\to+\infty} \frac{-5}{8x^2} = 0$$

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f) $\lim_{x \to 0^+} 3x \cdot \ln(2x) \overset{0 \cdot (-\infty)}{=} \lim_{x \to 0^+} \frac{\ln(2x)}{\frac{1}{3x}} = \lim_{x \to 0^+} \frac{\frac{1}{2x} \cdot 2}{\frac{0-3}{9x^2}}$

$= \lim_{x \to 0^+} \frac{2}{2x} \cdot \frac{9x^2}{-3} = \underline{\underline{0}}$