(1) [5] Find the limit:

$$\lim_{t\to 0} \frac{5^t - 3^t}{t} \sim \text{"}\frac{0}{0}\text{"}$$

$$\overset{H}{=} \lim_{t\to 0} \frac{5^t \ln(5) - 3^t \ln(3)}{1}$$

$$= \boxed{\ln(5) - \ln(3).}$$

(2) [5] Find the limit:

$$\lim_{x\to 1} \frac{1 - x - \ln(x)}{1 + \cos(\pi x)} \sim \text{"}\frac{0}{0}\text{"}$$

$$\overset{H}{=} \lim_{x\to 1} \frac{0 - 1 - \frac{1}{x}}{0 - \pi \sin(\pi x)}$$

As $x \to 1^+$, $\dfrac{-1-\frac{1}{x}}{-\pi \sin(\pi x)} \to \dfrac{-2}{0^+} = -\infty$

As $x \to 1^-$, $\dfrac{-1-\frac{1}{x}}{-\pi \sin(\pi x)} \to \dfrac{-2}{0^-} = +\infty$

$\boxed{\therefore \text{ limit does not exist.}}$

(3) [5] Find the limit:

$$\lim_{x\to 0}(1-2x)^{1/x} \sim \text{"}1^{\infty}\text{"}$$

$$\lim_{x\to 0}(1-2x)^{\frac{1}{x}} = \lim_{x\to 0} e^{\frac{1}{x}\ln(1-2x)}$$

Consider $\lim_{x\to 0} \frac{1}{x}\ln(1-2x)$

$$= \lim_{x\to 0} \frac{\ln(1-2x)}{x} \sim \text{"}\frac{0}{0}\text{"}$$

$$\stackrel{H}{=} \lim_{x\to 0} \frac{\left(\frac{-2}{1-2x}\right)}{1}$$

$$= -2$$

$$\therefore \lim_{x\to 0}(1-2x)^{\frac{1}{x}} = \boxed{e^{-2}}$$