1) a) $\int_0^1 \int_{1-x}^{1+x} \frac{2y}{x+1}\,dy\,dx = \int_0^1 \frac{y^2}{x+1}\Big|_{1-x}^{1+x} dx =$

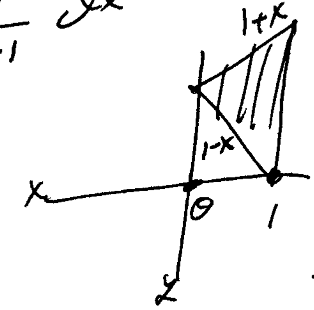
$$\int_0^1 \frac{(1+x)^2}{1+x} - \frac{(1-x)^2}{x+1}\,dx = \int_0^1 1+x - \frac{1}{x+1} + \frac{2x-x^2}{x+1}\,dx$$

$$= \int_0^1 1+x - \frac{1}{x+1} + 2\left(1 - \frac{1}{x+1}\right) - x\left(1 - \frac{1}{x+1}\right) dx$$

(using $\frac{u}{1+u} = 1 - \frac{1}{1+u}$)

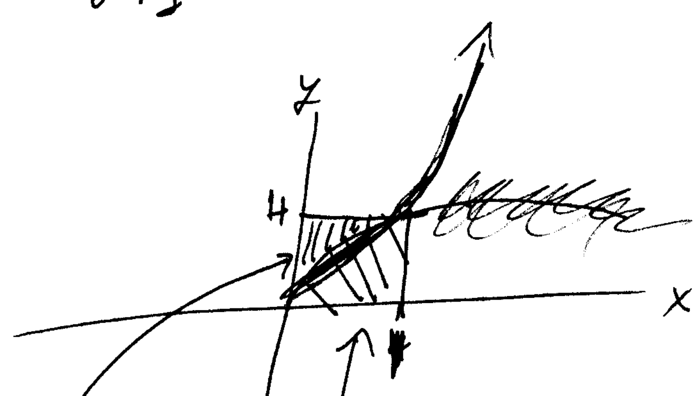
$$= \int_0^1 1+x - \frac{1}{x+1} + 2 - \frac{2}{x+1} - x + 1 - \frac{1}{x+1}\,dx$$

$$= \int_0^1 4 - \frac{4}{x+1}\,dx = \boxed{4 - 4\ln 2}$$



(can also rewrite this as $\int_0^1 \int_{1-y}^1 \frac{2y}{x+1}\,dx\,dy + \int_1^2 \int_{y-1}^1 \frac{2y}{x+1}\,dx\,dy$)

b) $\int_0^4 \int_{\sqrt{y/4}}^1 e^{x^3}\,dx\,dy$



switch order $\Rightarrow$ $4x^2 \le y \le 1$, $0 \le x \le 1$

$0 \le y \le 4x^2$

which one?

well x varies between $\sqrt{y/4} \le x \le 1$, not $0 \le x \le \sqrt{y/4}$!

so it's the second one!