1. To use importance sampling with Monte Carlo integration, we identified that the integrand of

$$I = \int_{-1}^{6} dx \int_{0}^{5} dy \int_{0}^{5} dz\, e^{-x/3} \left(1 + 0.1 \ln\left(\sqrt{x^2 + y^2 + z^2 + 1}\right)\right) \tag{1}$$

is mostly flat over the interval, in terms of y and z at least, so we can sample those values just by a uniform distribution over the interval. The x values need to be sampled according to $e^{-x/3}$, using the inverse transform method. To do this we consider w_i's distributed uniformly on $[0, 1]$. Then

$$\begin{aligned} w_i &= \int_{-\infty}^{x_i} e^{-x'/3} dx' \\ &= \int_{-1}^{x_i} e^{-x'/3} dx' \\ &= -3(e^{-x_i/3} - e^{-1/3}) \\ \implies x_i &= -3 \ln\left(-\frac{w_i}{3} + e^{1/3}\right) \end{aligned}$$

gives us the distribution of x values.
Now we want to calculate I using

$$I = \frac{1}{N} \sum_{i=1}^{N} \frac{f(x_i, y_i, z_i)}{w(x_i, y_i, z_i)}. \tag{2}$$

In this case $f(x, y, z)$ is the original integrand. $w(x, y, z)$ needs to be normalised, so can't just be $e^{-x/3}$, it needs to be divided by the product of the integral of it over the integration interval, including the y and z intervals, which turns out to be $-3(e^{-2} - e^{1/3}) \times 25$