1) $1 = \int_{-\infty}^{+\infty} \psi^* \psi \, dx = |c|^2 \int_0^{\infty} e^{-2\gamma x} dx = \frac{|c|^2}{2\gamma} \Rightarrow c = \sqrt{2\gamma}\, e^{i\alpha}$

where α can take any real value. For simplicity we will assume $\alpha = 0$.

2) First let us list the following two integrals:

$$\int_0^{\infty} x e^{-\beta x} dx = \frac{1}{\beta^2} \qquad \int_0^{\infty} x^2 e^{-\beta x} dx = \frac{2}{\beta^3}$$

Now

$$\langle x \rangle = |c|^2 \int_0^{\infty} x e^{-2\gamma x} dx = 2\gamma \cdot \frac{1}{(2\gamma)^2} = \frac{1}{2\gamma}$$

$$\langle x^2 \rangle = |c|^2 \int_0^{\infty} x^2 e^{-2\gamma x} dx = 2\gamma \cdot \frac{2}{(2\gamma)^3} = \frac{2}{(2\gamma)^2}$$

3) $\sigma = \sqrt{\langle x^2 \rangle - \langle x \rangle^2} = \sqrt{\frac{2}{(2\gamma)^2} - \frac{1}{(2\gamma)^2}} = \frac{1}{2\gamma}$

4) Probability of finding the particle in $[-\sigma, 0]$ is zero as the wave function is zero in this range

5) $P(0 \le x \le \sigma) = \int_0^{\sigma} |\psi|^2 dx = |c|^2 \int_0^{\sigma} e^{-2\gamma x} dx =$

$= 2\gamma \cdot \frac{1}{2\gamma}\left(1 - e^{-2\gamma\sigma}\right) = 1 - e^{-1} \approx 0.63$