Q1) Show that $y = C_1 x \cos(\ln x) + C_2 x \sin(\ln x)$ is the general solution of the following differential equation $x^2 y'' - xy' + 2y = 0$. Find a solution that satisfies $y(1) = 1; y'(1) = 0$.

Q2) Find the position function $x(t)$, from the given acceleration $a(t)$. Here $v(t)$ represents velocity at time $t$.

$$a(t) = \frac{1}{\sqrt{t+9}}, \quad v(0) = -1, x(0) = 1.$$