#p5. $0.01u'' + (1+\varepsilon)u' + u = 0$; $u(0) = 0$, $u(1) = 1$.

The characteristic func : $0.01r^2 + 1.01r + 1 = 0$.

$\Rightarrow r^2 + 101r + 100 = (r+1)(r+100) = 0 \Rightarrow r = -1, -100$.

$\Rightarrow$ homogenous solution : $u_h = \alpha e^{-x} + \beta e^{-100x}$

Apply BC. $u_h(0) = \alpha + \beta = 0$.

$u_h(1) = \alpha e^{-1} + \beta e^{-100} = 1$

$\Rightarrow \alpha \approx \frac{1}{e}$

$\beta \approx -\frac{1}{e}$.

$\Rightarrow u(x) \approx \boxed{e^{1-x} - e^{1-100x}}$.