2 b) $Var[X] = E[X^2] - E[X]^2$

$$E[\lambda(t)] = \int_0^2 \lambda_{max} (t-1)^2 \, ½ \, dt = ½ \lambda_{max} \cdot ⅓ \left[(t-1)^3 \right]_0^2$$

$$= \frac{\lambda_{max}}{6} \left[(2-1)^3 - -1^3 \right] = \frac{\lambda_{max}}{6} \cdot 2 = \frac{\lambda_{max}}{3}$$

$$E[\lambda(t)]^2 = \frac{\lambda_{max}^2}{9}$$

$$E[\lambda(t)^2] = \int_0^2 (\lambda_{max} (t-1)^2)^2 \, ½ \, dt = \lambda_{max}^2 \, ½ \int_0^2 (t-1)^4 dt$$

$$= \lambda_{max}^2 \, ½ \, ⅕ \left[(2-1)^5 - (0-1)^5 \right] = \frac{\lambda_{max}^2}{10} [1+1] = \frac{2}{10} \lambda_{max}^2$$

$$Var(\lambda) = \lambda_{max}^2 \left(\frac{1}{9} - \frac{2}{10} \right) = \lambda_{max}^2 \left(\frac{18}{90} - \frac{10}{90} \right) = \lambda_{max}^2 \frac{4}{45}$$