Problem 3:

Since they average 0.25 shutdowns per month, then they will average 3 shutdowns per year. Let X be a Poisson random variable with $\lambda t = 3$. Then we can use the Poisson distribution to compute $P(X \geq 3)$:

$$\begin{aligned} P(X \geq 3) &= 1 - P(X \leq 2) \\ &= 1 - \left[P(X = 0) + P(X = 1) + P(X = 2) \right] \\ &= 1 - 0.4232 \\ &= \mathbf{0.5768.} \end{aligned}$$

Problem 4:

Let Y be a Poisson random variable with $\lambda t = 0.25$. Then, the probability that one month has exactly 1 shutdown is: $P(Y = 1) = p(1, 0.25) \approx 0.1947$.

Then, each month can be seen as a Bernoulli trial in which there's a probability of success $p = P(Y = 1) = 0.1947$. Success here is having a month with exactly 1 computer shutdown. Then, to compute the probability that at least 3 months are successes, we can use the binomial distribution with $n = 12$ and $p = 0.1947$. Let Z be a random variable that denotes the number of months with exactly 1 computer shutdown. Then:

$$\begin{aligned} P(Z \geq 3) &= 1 - P(Z \leq 2) \\ &= 1 - P(Z = 0) + P(Z = 1) + P(Z = 2) \\ &= 1 - b(0; 12, 0.1947) + b(1; 12, 0.1947) + b(2; 12, 0.1947) \\ &= 1 - 0.0744 + 0.2158 + 0.287 \\ &= \mathbf{0.4228.} \end{aligned}$$