Question:

During each day, the probability that Thompson’s computer's operating system crashes at least once is 5%, independent of every other day. He wants to know the probability of at least 45 crash-free days out of the next 50 days. Using **normal** approximation to the binomial to find it.

Answer:

 Let S = X1 + X2 + X3 + … X50. Xi (random variable) $=\left\{\begin{array}{c}1, \& crash-free day\\0, \& crash day\end{array}\right.$

 E[S] = 50\*0.95 = 47.5, Var(S) = 50\*0.95\*0.05 = 2.375, σ = 1.54

We need to find P (S >= 45), and we use normal approximation to find it.

 P (S >= 45) = P (S > 44.5) = P ($\frac{S-47.5}{1.54}>\frac{44.5-47.5}{1.54}$) = 1 - φ (-1.948) = φ (1.948) = 0.974.