Conditions

1 out of 10 people default on their car loans. Last Month a bank approved 50 car loans. Use the Normal Approximation of the Binomial to find the probability at least three borrowers will default?

Solution

We know, that if sample size n is large enough, then the skew of the distribution is not too great. In this case a reasonable approximation to B(n, p) is given by the normal distribution:

$$\mathcal{N}(np,\ np(1-p)),$$

For our case, the probability of success (p) is:

$$p = \frac{1}{10} = 0.1$$

And the sample size (n) is 50. Hence, the probability of at least three borrowers will default is:

$$P = 1 - (C_2^{50} \cdot 0.1^2 \cdot 0.9^{48} + C_1^{50} \cdot 0.1^1 \cdot 0.9^{49} + 0.9^{50}) = 0.888$$

Answer: 0.888