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Q1

C_i = mass of cereal box i (R.V.)

$C_i \sim \text{Normal}\left(\mu_{C_i} = 385\text{g}, \sigma^2_{C_i} = (5\text{g})^2\right)$

We want: $P(C_1 + \dots + C_{10} < 3800\text{g}) = ?$

Assume $C_i \perp C_j$ $(i \neq j)$ $\Rightarrow$ The given thm holds

$\therefore$ $C_1 + \dots + C_{10} \sim \text{Normal}\left(\mu = 3850\text{g}, \sigma^2 = 250\text{g}^2\right)$

$\mu = \sum_{i=1}^{10} \mu_{C_i} = \sum_{i=1}^{10} 385 = 3850\ (\text{g}),$

$\sigma^2 = \sum_{i=1}^{10} \sigma^2_{C_i} = \sum_{i=1}^{10} 5^2 = 250\ (\text{g}^2)$

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$$\Rightarrow P(C_1 + \dots + C_{10} < 3800\,g)$$

$$P\left(\frac{\sum_{i=1}^{10} C_i - 3850}{\sqrt{250}} < \frac{3800 - 3850}{\sqrt{250}} \right)$$

$$P(Z < -3.162278) \approx 0$$

$$0.0782701\%$$

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Q3 $X \sim N(\mu = 27, \sigma^2 = 3^2)$

$$P(X<t) = P\left(\frac{X-27}{3} < \frac{t-27}{3}\right) = \Phi\left(\frac{t-27}{3}\right)$$

(a) $P(X<20) = \Phi\left(\frac{20-27}{3}\right) = \Phi\left(\frac{-7}{3}\right) = 0.981539\%$

(b) $P(15<X<25) = \Phi\left(\frac{25-27}{3}\right) - \Phi\left(\frac{15-27}{3}\right)$

$= \Phi(-2/3) - \Phi(-4)$

$= 25.24925\% - 0.00316712\,4\%$

$= 25.2460\,9\%$

(c) $P(X>50) = 1 - P(X<50) = 1 - \Phi\left(\frac{50-27}{3}\right)$

$= 1 - \Phi(7.\overline{6})$

$\approx 1 - 1 = 0\%$