① 60 рублей $X = U_1 + U_2 + \ldots + U_{60}$ $U_i \sim U(0,1)$

1) Согласно ЦПТ: $S_n = X_1 + \ldots + X_n \to N(n \cdot E(x_i); n \cdot Var(x_i))$

, т.е $nE[X] = 60 E(U) = 60 \cdot \frac{1}{2} = 30$

$E(U) = \frac{0+1}{2} = \frac{1}{2}$

$nVar(X) = 60 Var(U) = 60 \cdot \frac{1}{12} = 5$

$Var(U) = \frac{(1-0)^2}{12} = \frac{1}{12}$

$\Rightarrow X \sim N(30, 5)$

2) $Z = \frac{X - \mu}{\sigma} = \frac{X - 30}{\sqrt{5}} \Rightarrow P(X > 20) = P\left(\frac{X-30}{\sqrt{5}} > \frac{20-30}{\sqrt{5}}\right)$

, т.е $P(Z > -4,47) = 1$

② $Z_n = \frac{X_1 + X_2 + \ldots + X_n}{Y_1 + Y_2 + \ldots + Y_n}$; $E(X_i) = 2$; $E(Y_i) = 4$

По ЗБЧ: $\frac{1}{n}\sum_{i=1}^{n} X_i = E(X_i) = 2$ и $\frac{1}{n}\sum_{i=1}^{n} Y_i = E(Y_i) = 4$

, т.е $\lim_{n \to \infty} Z_n = \frac{2}{4} = \frac{1}{2}$

Ответ: 0,5

③ $E(X_i) = 20$; $Var(X_i) = 1$; $E(Y_i) = 18$; $Var(Y_i) = 4$; 40 значений

1) Согласно ЦПТ: $S_n \to N(n \cdot E(X_i + Y_i); n \cdot Var(X_i + Y_i))$

$E(X_i + Y_i) = E(X_i) + E(Y_i) = 20 + 18 = 38$

$E(S) = 40 \cdot 38 = 1520$

$Var(X_i + Y_i) = Var(X_i) + Var(Y_i) = 1 + 4 = 5$

$Var(S) = 40 \cdot 5 = 200 \Rightarrow \sigma = 10\sqrt{2}$

, т.е $S_n \to N(1520; 200)$

$P(S > 1550) = P\left(\frac{S - 1520}{10\sqrt{2}} > \frac{1550 - 1520}{10\sqrt{2}}\right) \Rightarrow$

$\Rightarrow P\left(Z > \frac{3}{\sqrt{2}}\right) \approx 0,017$

④ 10000 q. $P(4900 \le X \le 5100)$

Вероятность ответа равновероятна, т.е $p = 0,5$

$\Rightarrow E(X) = 10000 \cdot 0,5 = 5000$, а $Var(X) = 10000 \cdot 0,5(1-0,5) =$

$= 2500$, i.e $\sigma = 50$

$Z = \dfrac{X - 5000}{50} \implies P\left(\cancel{4800 - \ldots} \dfrac{4900 - 5000}{50} \leq Z \leq \cancel{480} \dfrac{5100 - 500}{50} \right)$

$\implies P(-2 \leq Z \leq 2) \approx 0.9544$

~~P(X ≤ ...)~~   ~~P(X ...)~~