HW1

① $P(2.5 < x < 3.5) = \frac{3.5-2.5}{4-2} = \frac{1}{2} = 0.5$

② a) $\int_1^{+\infty} \frac{c}{u^4}\,du = -\frac{c}{3u^3}\Big|_1^{+\infty} = -\underbrace{\frac{c}{3u^3}}_{\to 0,\ u\to+\infty} + \frac{c}{3} = \frac{c}{3}$

$\frac{c}{3} = 1;\quad c = 3$

б) $\int_1^3 \frac{3}{u^4}\,du = -\frac{3}{3u^3}\Big|_1^3 = -\frac{1}{27} + 1 = \frac{26}{27}$

в) $\int_7^{+\infty} \frac{3}{u^4}\,du = -\frac{3}{3u^3}\Big|_7^{+\infty} = -\underbrace{\frac{1}{u^3}}_{\to 0,\ u\to+\infty} + \frac{1}{343} = \frac{1}{343}$

③ оказалась бракованная:

$0.04 \times 0.7 + 0.01 \times 0.3 = 0.028 + 0.003 = 0.031$ (3.1%)

бракованная на 1м станке

$\frac{0.7 \times 0.04}{0.031} = \frac{0.028}{0.031} = 0.903$ (90.3%)

бракованная со 2го станка

$\frac{0.3 \times 0.01}{0.031} = \frac{0.003}{0.031} = 0.096$ (9.6%)

④ ровно 6 орлов:

$\left(\frac{1}{2}\right)^6 \times \frac{1}{6} = \frac{1}{384}$

ровно 1 орел:

1 $\frac{1}{2}$

2 $C_2^1 \times \left(\frac{1}{2}\right)^1 \times \left(\frac{1}{2}\right)^{2-1} = 2 \times \frac{1}{2} \times \frac{1}{2} = 2 \times \frac{1}{2^2}$

3 $3 \times \frac{1}{2^3}$

4 $4 \times \frac{1}{2^4}$

5 $5 \times \frac{1}{2^5}$

6 $6 \times \frac{1}{2^6}$

$\frac{1}{6} \times \left(\frac{1}{2} + \frac{1}{2} + \frac{3}{8} + \frac{4}{16} + \frac{5}{32} + \frac{6}{64} \right) = \frac{1}{6}\left(1 + \frac{10}{16} + \frac{16}{64}\right) =$

$= \frac{1}{6} \times \frac{120}{64} = \frac{20}{64} = \frac{10}{32} = \frac{5}{16}$

⑤ $P = \frac{4/10}{4/10 + 2/10 + 1/10} = \frac{4}{10} \times \frac{10}{7} = \frac{4}{7}$ (57%)

⑥ $E = 0 \times \frac{1}{2} + 2 \times \frac{1}{4} + \frac{1}{8} \times 4 + \frac{1}{8} \times 8 = \frac{1}{2} + \frac{1}{4} + 1 = \frac{7}{4} = 1.75$

⑦ $\int_0^1 (e^x + 2)\,dx = e^x + 2x \Big|_0^1 = e + 2 - 1 = e + 1 = 3.71$

⑧ $\int_0^3 \frac{1}{30} e^{-\frac{u}{30}}\,du = -\frac{30}{30} \times e^{-\frac{u}{30}} \Big|_0^3 = -e^{-\frac{3}{30}} + e^0 = -e^{-\frac{1}{10}} + 1 \approx$

$\approx 1 - 0.905 = 0.095$

$\int_{10}^{+\infty} \frac{1}{30} e^{-\frac{u}{30}}\,du = -e^{-\frac{u}{30}} \Big|_{10}^{+\infty} = -e^{\frac{+\infty}{-30}} + e^{-\frac{10}{30}} = e^{-\frac{1}{3}} \approx$

≈ 0.71

$\int_{30}^{+\infty} \frac{1}{30} e^{-\frac{u}{30}}\,du = -e^{-\frac{u}{30}} \Big|_{30}^{+\infty} = -e^{\frac{+\infty}{-30}} + e^{-\frac{30}{30}} = \frac{1}{e} \approx 0.37$

⑨ 2% $\frac{2}{100} = \frac{1}{50}$ $\Rightarrow$ деталь дефектная на 50 шаге

$\Rightarrow \approx 49$ деталей качественные

⑩ Проиграли:

$P = \left(\frac{1}{2}\right)^6 = 0.0156 = 1.56\%$

Размер $150\$ \times 0.0156 = 2.34$

Выиграли: $P = 1 - \left(\frac{1}{2}\right)^6 = 1 - 0.0156 = 0,984$ (98.4%)

Размер: $1\$ \times 0.984 = 0.984$

$E = 2.34 - 0.984 = 1.356$