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Problem 1 (5 points) Exercise 4.70 from Textbook

8/x^3 (x>2)
g(x) = { 0 , elsewhere

h(y) = {2y, (0<y<1) }
0, elsewhere

ux =

$$E(X)=\int_2^{\infty} x\ g(x)\ dx = 8\int_2^{\infty} x \cdot \frac{1}{x^3}\ dx = -8 \cdot \left[0-\frac{1}{2}\right] = 4$$

Problem 2 (10 points: 5 pts/question) Exercise 4.73 from Textbook

a) ux=E(x) =

$$\int_0^5 x\ f(x)\ dx = \frac{1}{5}\int_0^5 x\ dx = \frac{1}{10} \cdot (5^2\text{-}0) = 2.5$$

$$\sigma^2 = E[(X\text{-}\mu)^2] = E\left[(X\text{-}2.5)^2\right] = E\left(X^2\right) - 5\ E(X) + 2.5^2 = \int_0^5 x^2 f(x)dx - 12.5 + 6.25 = 5 \cdot 5 \cdot \frac{1}{3} \text{-}6.25 = 2.08$$

b)

$$P(\mu\text{-}2\sigma < X < u + 2\sigma) = P\,[\text{-}1.66 < x < 6.66] = \int_{-166}^{0} 0\ dx + \int_0^5 \frac{1}{5}\ dx + \int_5^{6.66} 1\ dx = 1$$

insert k =2 into Chebyshev Theorem, above is true since 1 - 1/2^2 = 0.75

insert k =3 into Chebyshev Theorem, above is also true since 1 - 1/3^2 == 8/9

Problem 3 (5 points) Exercise 4.74 from Textbook

P = 50 I^2

ui = E[I] = 15

oi ^ 2 = 0.03

let g(I) = 50 i^2 then
P = g(i)
up = E[P] = E[g(i)] = g(ui) + $\frac{\delta^2}{\delta I^2}(g(I))$ I * oi^2 / 2 =11251.5

var (P) = var [g(I)] = 67500

Problem 4 (10 Points: 5 pts/question) Exercise 5.6 from Textbook

a) P(2<=X<=5) = P (X<=5) - P (X<2) = 0.9844 - 0.1094 = 0.875

b) P(x<3) = P (X <= 2) = 0.3438

Problem 5 (5 points) Exercise 5.19 from Textbook

P(G) = 0.35 let the number of G happened be x
P(Y) = 0.05 …….y
P(R) = 0.6 …….z

Joint distribution f(G,Y,R) = $\binom{n}{g,y,r}(0.35)^x(0.05)^y(0.6)^z$