Question 1

MGF for Bernoulli(p)

1. $MGF_X(t) = E[e^{Xt}]$ ← finite parameter; ↑ random variable

2. Distinct values of X = 0 and 1 ← weighted avg. of

3. $MGF_X(t) = p \cdot e^{1 \cdot t} + (1-p)e^{0 \cdot t} = pe^t + (1-p)$

MGF(X+Y) given X & Y are independent r.v.

$$MGF_{X+Y}(t) = E[e^{(X+Y)t}]$$

$$= E[e^{Xt} \cdot e^{Yt}]$$

independence ↓

$$= E[e^{Xt}]E[e^{Yt}] = MGF(X) \times MGF(Y)$$

MGF of Binomial(n, p)

↙ i.d. Bernoulli

$$X_{n,p} = X_1(p) + X_2(p) + \dots + X_n(p)$$

$$MGF[X_{n,p}] = [pe^t + (1-p)]^n$$