

MATH 241 Homework 12

Due: Sunday 5/23 11:59pm to Moodle

• Chapter 7 Problem 75

The moment generating function of X is given by $M_X(t) = \exp\{2e^t - 2\}$ and that of Y by $M_Y(t) = (\frac{3}{4}e^t + \frac{1}{4})^{10}$. If X and Y are independent, what are

- (a) $P\{X + Y = 2\}$?
- (b) $P\{XY = 0\}$?
- (c) $E[XY]$?

• Chapter 7 Problem 77

The joint density of X and Y is given by

$$f(x, y) = \frac{1}{\sqrt{2\pi}} e^{-y} e^{-(x-y)^2/2}, 0 < y < \infty, -\infty < x < \infty$$

- (a) Compute the joint moment generating function of X and Y .
- (b) Compute the individual moment generating functions.

• Chapter 7 Problem 79

Successive weekly sales, in units of \$1,000, have a bivariate normal distribution with common mean 40, common standard deviation 6, and correlation 0.6.

- (a) Find the probability that the total of the next 2 weeks' sales exceeds 90.
- (b) If the correlation were 0.2 rather than 0.6, do you think that this would increase or decrease the answer to (a)? Explain your reasoning.
- (c) Repeat (a) when the correlation is 0.2.

• Chapter 8 Question 5

Fifty numbers are rounded off to the nearest integer and then summed. If the individual round-off errors are uniformly distributed over $(-0.5, 0.5)$, approximate the probability that the resultant sum differs from the exact sum by more than 3.

• Chapter 8 Question 6

A die is continually rolled until the total sum of all rolls exceeds 300. Approximate the probability that at least 80 rolls are necessary.