

Full credit given for 3 (out of 5) correct answers.

Quote all numbers in DECIMAL, to at least 4 significant digits.

Enter all final answers (usually a single number) in the booklet.

Email your Maple to jvr bik@brocku.ca (and keep a copy).

Open-book exam.

Duration: 1 hour

1. Consider playing a game with the following pay-off table, independently, 200 times:

$X =$	-2	0	4	10
Pr	0.56	0.28	0.14	0.02

Using the Normal approximation (aka CLT) with continuity correction, estimate the probability of losing more than \$50. Also, compute the exact answer.

2. Assuming A , B , C and D to be mutually *independent* events with $\Pr(A) = 0.62$, $\Pr(B) = 0.71$, $\Pr(C) = 0.38$ and $\Pr(D) = 0.55$, compute

$$\Pr[(\bar{A} \cap B \cap C \cap D) \cup (A \cap \bar{B} \cap C) \cup (C \cap \bar{D}) \cup B]$$

3. A random variable X has the following pdf:

$$f(x) = \begin{cases} \frac{1}{2} + x & -\frac{1}{2} \leq x < 0 \\ \frac{3}{4} & 0 \leq x < \frac{1}{2} \\ c(1-x) & \frac{1}{2} \leq x < 1 \\ 0 & \text{otherwise} \end{cases}$$

Find

- (a) the value of c ,
 (b) $\Pr(-0.1 < X < 0.6)$,
 (c) $\text{Var}(X)$.
4. Suppose 7 cards are randomly dealt from a regular deck (of 52 cards), and 10 points awarded for each ace and 3 points for each spade (13 points for the ace of spades) found in the resulting hand. Let X denote the number of points received. Compute

- (a) the mean and standard deviation of X ,
- (b) $\Pr(X > 15)$. Hint: use the corresponding PGF.

5. Assuming that X and Y have the following joint pdf

$$f(x, y) = \begin{cases} c \cdot (1 + x^2) \cdot \frac{\exp(-2x - y)}{\sqrt{y}} & \text{when } x > 0 \text{ and } y > 0 \\ 0 & \text{otherwise} \end{cases}$$

find

- (a) the value of c
- (b) and $\Pr(3X + 2Y > 4)$.
- (c) Are X and Y independent (substantiate your answer)?