Discrete Mathematics and Probability

Week 1 Lecture 1
Welcome to the Course

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Monday 18 September 2023
Semester 1 Week 1

THE UNIVERSITY *of* EDINBURGH

Welcome to DMP

Discrete Mathematics and Probability

This is a second-year undergraduate course for students in the School of Informatics.

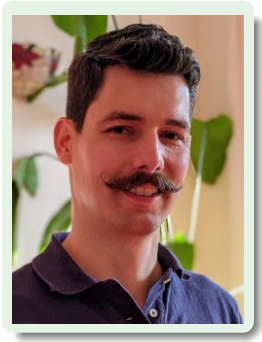
The course will cover topics fundamental to many areas of computer science: sets, numbers, functions, relations, methods of proof, counting methods, probability, random variables, distributions, and statistics.

Many of you will recognize some of this material and be more or less confident in using it; for everyone some part will include new things. The aim is that end of the course all of you will be capable in working across all the topics covered.

Lectures	Monday and Thursday 1410–1500
Tutorials	Tuesday, Wednesday, Thursday, starting in Week 2
Coursework	Weekly online quizzes and written homework
Exam	Mid-semester class test and end-of semester final exam

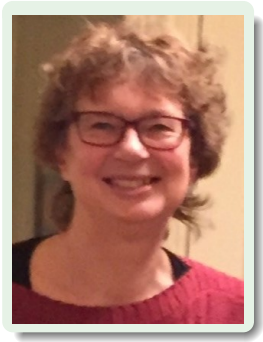
DMP Cast Members

Rob van Glabbeek



Chris Heunen

Ian Stark



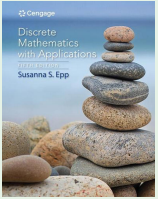
Heather Yorston

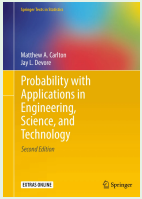
Resources

Lectures

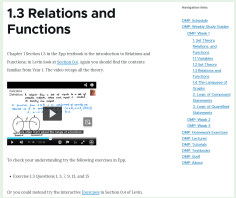
Tutorials

Textbooks



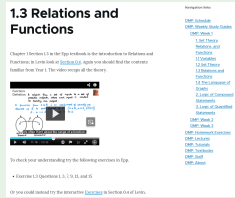


Study Guides

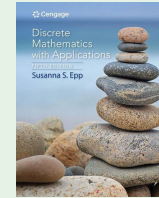


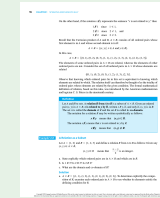
Weekly Study Guides

Study Guides

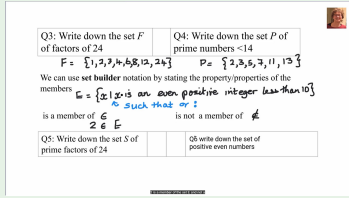


Reading

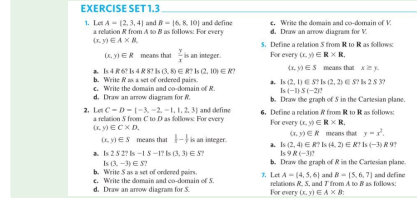




Videos

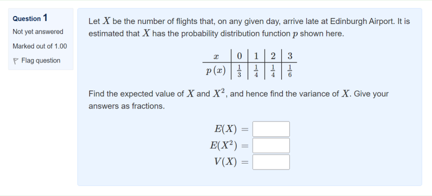


Exercises



More Ways to Learn

Quizzes



Question 1

Not yet answered

Marked out of 1.00

Flag question

Let X be the number of flights that, on any given day, arrive late at Edinburgh Airport. It is estimated that X has the probability distribution function p shown here.

x	0	1	2	3
$p(x)$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{6}$

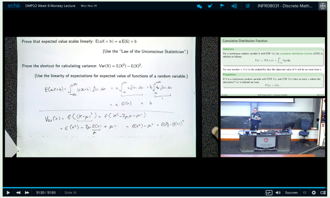
Find the expected value of X and X^2, and hence find the variance of X. Give your answers as fractions.

$E(X) =$ ☐

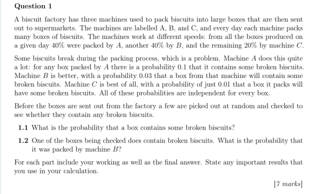
$E(X^2) =$ ☐

$V(X) =$ ☐

Recordings



Homework Exercises



Question 1

A biscuit factory has three machines used to pack biscuits into large boxes that are then sent out to supermarkets. The machines are labelled A, B, and C, and every day each machine packs many boxes of biscuits. The machines work at different speeds: from all the boxes produced on a given day 40% were packed by A, another 40% by B, and the remaining 20% by machine C.

Some biscuits break during the packing process, which is a problem. Machine A does this quite a lot: for any box packed by A there is a probability 0.1 that it contains some broken biscuits. Machine B is better, with a probability 0.03 that a box from that machine will contain some broken biscuits. Machine C is best of all, with a probability of just 0.01 that a box it packs will have some broken biscuits. All of these probabilities are independent for every box.

Before the boxes are sent out from the factory a few are picked out at random and checked to see whether they contain any broken biscuits.

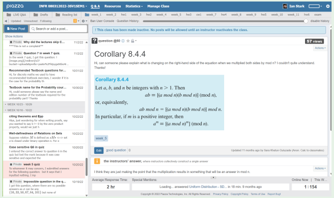
1.1 What is the probability that a box contains some broken biscuits?

1.2 One of the boxes being checked does contain broken biscuits. What is the probability that it was packed by machine B?

For each part include your working as well as the final answer. State any important results that you use in your calculation.

[7 marks]

Piazza

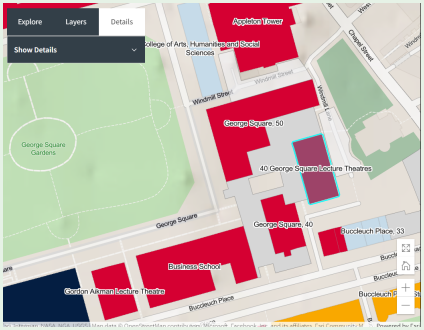


Lectures

1410–1500 Monday and Thursday every week

Lecture Theatre B of the 40 George Square Lecture Theatres

Lectures will be streamed live and then available for review. Access is through Learn.



Tutorials

Tutorials start in Week 2 and run on Tuesday, Wednesday, and Thursday.

There are seven tutorial groups, with automated allocation to fit with existing timetable commitments. Each group has two assigned tutors.

In the tutorial students work in small groups on a problem sheet for the week. There is also opportunity to review homework exercises and discuss with tutors.

If you are unable to attend your assigned tutorial group one week then please go to one of the other groups, telling the tutor there when you arrive.

If you wish to switch to a different tutorial time then please submit a Group Change Request through the *Personalized Timetable* section of the Timetabling website.

Homework Exercises

Weekly homework exercises are released after the Thursday lecture for completion by noon on the following Thursday. Submission is by upload to GradeScope, reached through Learn. There are no extensions or extra time adjustments for weekly exercises.

Submissions are marked by tutors and returned with comments; tutorials also include review of the previous homework exercises.

There are six sets of homework exercises: the highest four marks are combined and contribute to final course grades.

Online Quizzes

Weekly online quizzes are released after the Thursday lecture for completion by noon on the following Thursday. Quizzes run on STACK/CodeRunner, reached through Learn.

Once starting a quiz you have 60 minutes to complete it. You are allowed up to two attempts and the highest mark is retained. Students with additional time in exams get correspondingly more time to complete each quiz. There are however no extensions or extra time adjustments for late submission.

The online tool provides automatic marking and custom feedback for each submission.

There are ten quizzes through semester: the highest eight marks are combined and contribute to final course grades.

Weekly Timetable

Thursday 1410–1500 Lecture and release of study guide, videos, homework, online quizzes

Monday 1410–1500 Lecture

Tuesday, Wednesday, Thursday Tutorial meetings

Thursday 1200 Deadline for completion of online quizzes and upload of homework solutions

Thursday 1410–1500 Lecture

This course accounts for 1/3 of your academic credit this semester and you should plan to spend on it a correspondingly substantial fraction of your study time. I recommend a baseline of at least 10 hours each week across in-person activities, studying, and coursework.

Assessment

Class Test in Week 6 with questions from the first part of the course

Final Exam in December with questions from the second part of the course and stretch questions covering all of DMP

Results of homework, quizzes, class test, and final exam are combined in ratio 1:2:3:4 to give a weighted mean mark and overall grade for the course. The overall pass threshold is 40/100 and there is no "force-fail" or requirement to pass components individually.

(Homework: 10%; Quizzes: 20%; Class Test: 30%; Final Exam: 40%)

A resit examination in August 2024 offers a complete retest of all material in the course.

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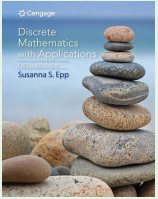

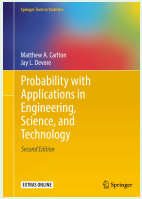

Study Guides