

This homework runs from Thursday 2 November 2023 until 12 noon on Thursday 9 November 2023. Submission is to Gradescope Homework 4.

**Question 1**

- (a) In how many ways can the integers 1 through 7 be permuted so that no odd integer will be in its natural position?
- (b) If all the possibilities of part (a) are equally likely, what is the probability that exactly two of the seven integers are in their natural position?

[4 marks]

**Question 2**

A art box has in it 20 pencils: 5 red, 5 blue, and 10 green. You cannot distinguish between pencils of the same colour. You take out three pencils at random, one at a time, without replacement. Suppose  $X$  is the random variable ‘the total number of red pencils taken out’.

- (a) Copy the following table and fill in the probability distribution for  $X$ .

|            |   |   |   |   |
|------------|---|---|---|---|
| $x$        | 0 | 1 | 2 | 3 |
| $P(X = x)$ |   |   |   |   |

- (b) Calculate the expected number of red pencils  $E(X)$ .
- (c) Calculate the standard deviation of  $X$ .

For each part include your working as well as the final answer.

[6 marks]