Problem 1: Ten people show up at the local YMCA for a pickup basketball game.

(a) In how many ways can the group be divided into two teams of 5 each?

$$_{10}C_5 = 252$$

(b) Suppose 6 of the ten players were lined up to practice free throws. How many different lineups are possible?

$$_{10}P_6 = 151,200$$

Problem 2: These are the grades on a test in a class with 16 students.

$$52, \quad 52, \quad 52, \quad 56, \quad 56, \quad 62, \quad 65, \quad 65, \quad 67, \quad 76, \quad 78, \quad 87, \quad 87, \quad 88, \quad 89, \quad 98$$

Give the 5-number summary for this dataset and construct a boxplot for the dataset. Be sure to scale and label the plot appropriately.

Min	Q_1	Median	Q_3	Max
52	56	66	87	98
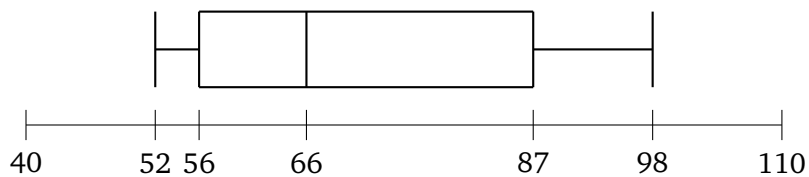
Problem 3: Suppose the GPA of students at a university are approximately normally distributed with mean 3.35 and standard deviation 0.31. At the end of the academic year, the university wants to examine the GPA of their latest Freshmen class to assess the quality of the students they are admitting to the university.

(a) Find the probability that one randomly selected freshmen student has a GPA of 3.00 or higher.

$$z_3 = \frac{3 - 3.35}{0.31} = -1.13 \rightsquigarrow 0.1292$$
$$1 - 0.1292 = 0.8708$$

(b) Find the probability that a randomly selected group of 27 freshmen have an average GPA of 3.00 or higher.

$$z_{group} = \frac{3 - 3.35}{\frac{0.31}{\sqrt{27}}} = \frac{-0.35}{0.0597} = -5.86 \rightsquigarrow 0.$$
$$1 - 0. = 100.$$

(c) Explain the difference between (a) and (b).

The first problem was the probability that an individual *scores a GPA of 3.00 of higher while the second was whether a* group *scored a collective average of 3.00 or higher.*

(d) Suppose you examined 113 freshmen students and found they had an average GPA of 3.11. What was the probability that the average of these 113 freshmen's GPA would be 3.11 or lower?

$$z_{3.11} = \frac{3.11 - 3.35}{\frac{0.31}{\sqrt{113}}} = \frac{-0.24}{0.0292} = -8.22 \rightsquigarrow 0.$$

(e) Given your answer in (c) and the fact that the mean GPA of students at this university is 3.35, do you believe the recently admitted Freshmen are of the same 'type' or 'quality' as the rest of the university's students? Explain.

The chance that these 113 Freshmen would have this group average, assuming that they come from the 'same type' of students (students with a GPA mean of 3.35) is essentially 0. It is more likely that they are a 'different type' of student, i.e. that they have lower GPAs that previous students.