$$F = P(1+rt) \quad F = P\left(1 + \tfrac{r}{n}\right)^{nt} \quad F = D\frac{\left(1+\frac{r}{n}\right)^{nt}-1}{\frac{r}{n}} \quad P = R\frac{1-\left(1+\frac{r}{n}\right)^{-nt}}{\frac{r}{n}} \quad APY = \left(1 + \tfrac{r}{n}\right)^{n} - 1$$

$$\frac{a}{b} = \frac{1-P(E)}{P(E)} \qquad P(E) = \frac{b}{a+b} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(B|A) = \frac{n(A \text{ and } B)}{n(A)} = \frac{P(A \text{ and } B)}{P(A)}$$

$$P(A \text{ and } B) = P(A) \cdot P(B|A) \qquad P(A \text{ and } B) = P(A) \cdot P(B) \text{ if } A \text{ and } B \text{ are independent}$$

$$\text{angle} = (\text{relative frequency}) \cdot 360° \qquad Z = \frac{X - \mu}{\sigma}$$

$$\mu = \frac{x_1 + x_2 + \cdots + x_n}{n} \qquad \sigma = \sqrt{\frac{(x_1 - \mu)^2 + (x_2 - \mu)^2 + \cdots + (x_n - \mu)^2}{n}}$$

$$\mu = \frac{f_1 x_1 + f_2 x_2 + \cdots + f_n x_n}{f_1 + f_2 + \cdots + f_n} \qquad \sigma = \sqrt{\frac{f_1(x_1 - \mu)^2 + f_2(x_2 - \mu)^2 + \cdots + f_n(x_n - \mu)^2}{f_1 + f_2 + \cdots + f_n}}$$

1. (4pts) What is the future value of $800 deposited for 15 months in an account bearing simple interest of 4%?

2. (5pts) If Z is a random variable for a standard normal distribution, compute the probability below. Draw a picture showing which area you are computing.

$P(Z \leq 0.35) =$

3. (12pts) Restaurant patrons rated restaurants in a town on a scale 0–4 (4 is best). The results of the survey are shown below.

a) Find the median rating.
b) Find the mean rating.
c) Find the standard deviation.

Rating	Frequency
4	7
3	15
2	9
1	8
0	4

4. (4pts) If 78 votes are cast, what is the smallest number of votes a winning candidate can have in a four-candidate race that is decided by plurality? Justify your answer.

5. (14pts) A pool of critics ranked three leading contemporary symphony orchestra conductors. Their rankings are shown in the table.

Percent of votes:	14	18	15	23	17	13
Franz Welzer-Möst *(Cleveland)*	1	1	2	3	2	3
Michael Tilson Thomas *(San Francisco)*	2	3	1	1	3	2
Sir Simon Rattle *(Berlin)*	3	2	3	2	1	1

a) Which conductor wins in a plurality election?

b) Which conductor wins using the Condercet method, if any?

c) Which conductor wins using the Borda method?

d) Perform the check on the sum of Borda points.

e) In the Borda method, can the critics who ranked Rattle first and Welzer-Möst second obtain a preferable outcome if they voted strategically, assuming all the other critics voted as shown in the table?

6. (7pts) A family would like to save up to buy new furniture. They can get a savings account bearing 4% compounded weekly. How much should they deposit at the end of every week

a) in order to have $10,000 after 2 years?

b) in order to have $15,000 after 2 years (use answer from a)?

7. (7pts) Superman wishes to fund the construction of 45 additional phone booths around Metropolis at a cost of $360,000. Suppose he can get a 20-year loan with interest rate 6%, compounded monthly.

a) What is his monthly payment?

b) What is the balance on the loan after 8 years?

8. (7pts) Two dice are rolled.

a) How many outcomes does this experiment have?

b) What is the probability that the sum on the two dice is 8?

c) What is the probability that the sum is at most 4?

9. (6pts) A class of 50 students was observed one day: 32 had a cell phone, 26 were wearing flip-flops, and 17 both had a cell phone and were wearing flip-flops. What is the probability that a randomly chosen student

a) has a cell phone or is wearing flip-flops?

b) does not have a cell phone and is not wearing flip-flops?

10. (4pts) Walking to class on a typical day, George has a 35% chance of running into Mary and a 57% chance of running into Louisa. Assuming that Mary's appearance is independent from Louisa's, what is the probability that George misses both women?

Bonus. (7pts) Find an approximate solution to the traveling salesman problem for a circuit starting at the top of the graph. Show the weight of the found circuits. Use
a) the nearest neighbor algorithm
b) the greedy algorithm.