

Use your calculator to compute each expression to 6 significant digits accuracy. Write down the sequence of keys you entered in order to compute each expression. Do not round numbers in mid-computation.

1. (3pts) $\sqrt[5]{14} =$

2. (4pts) $1200 \left(1 + \frac{0.045}{4}\right)^{16} =$

3. (4pts) $\sqrt[5]{4.12 + 13.9} =$

4. (3pts) $\frac{\log 0.356}{\log 0.13} =$

5. (4pts) $\frac{\log(6.35)}{17 \log 3.17} =$

6. (6pts) $\frac{\left(1 + \frac{0.05}{12}\right)^{24} - 1}{\frac{0.05}{12}} =$

7. (6pts) $\frac{1 - \left(1 + \frac{0.0375}{12}\right)^{-120}}{\frac{0.0375}{12}} =$

1. (4pts) Jill deposited \$500 in an account bearing a simple annual interest rate of 5.4%. If this deposit grows to \$575, how long was it in the account?

2. (6pts) What is a better deal on a certificate of deposit:

- a) an account earning 3.65%, compounded daily, or
- b) an account earning 3.71%, compounded monthly?

3. (5pts) A family that would like to buy an \$18,500 car plans to save for it over 3 years by depositing money every week into an account bearing 6%, compounded weekly. What should be the amount of the deposit?

4. (7pts) Today, you buy the stock of Oracle corporation at \$20 per share. You hope to sell it in 3 years at \$35 per share. What annual compound interest rate would this growth correspond to?

5. (8pts) Jeremy decides to set up a college fund for his newborn. If he can deposit \$200 every month into an account bearing 7.2%, compounded monthly, how long will it take until there is \$50,000 in the account?

This is an exercise in computing the payment on a hypothetical loan and comparing it with the numbers that financial services websites give you. Do the following:

1. (2pts) Decide on an amount and purpose for a hypothetical loan (e.g. buying a car, house, starting a business, etc.) Choose over how many years it should be repaid. Standard choices for each category are suggested: 15, 20, 30 years for a home, 3, 4, 5 years for a car, etc.

2. (7pts) Find a financial services website that computes a monthly payment based on a loan amount. Many banks' or mortgage originators' websites have mortgage calculators, for example. Use their calculator and the actual interest rate that they offer to find the monthly payment on your hypothetical loan. Print out the webpage, showing loan amount, term, interest rate and payment and attach it to this one. Try to keep it to just one sheet.

(Attachment)

3. (6pts) Using our loan formula from 3.5, compute (write the computation here) the monthly payment on your hypothetical loan. Use the interest rate that you found on the website. The frequency of compounding is typically monthly. Does your number agree with the information on the website you found?

4. (7pts) Find the balance of the hypothetical loan after half of all payments have been made.

5. (8pts) Write an amortization schedule for the four payments after half of all payments have been made. (For example, if it's a 60-month loan, consider payments 31, 32, 33 and 34.)

1. (6pts) Our experiment involves a “deck” of four cards: king, queen, jack and ace, all of hearts. We consecutively draw two cards from the deck (without returning).

- a) List all the outcomes of this experiment. How many outcomes does this experiment have?
- b) List the outcomes for which one of the cards is an ace.
- c) What is the probability of drawing an ace among the two cards?

2. (3pts) Suppose the house odds on the horse Faster Than Thou are 2 to 5. If you think the horse's chances of winning are 60%, is this a fair bet? Who does it favor?

3. (5pts) In a class of 15 students, 9 are wearing jeans, 7 are wearing a T-shirt with a statement, and 3 are wearing both. If a student is randomly selected, what is the probability

- a) they are wearing jeans or a T-shirt with a statement?
- b) they are not wearing at least one of the two clothing items?

4. (2pts) If a die is rolled, the odds against getting an even number are _____ to _____.

5. (9pts) The probability of winning a bet on a single number in roulette is $1/38$. Suppose you play roulette two times in a row. What is the probability that

a) you win both times? b) you lose both times? c) you win exactly once?

d) Add your answers in a)–c). Is it what you expect? Why?

6. (5pts) A game of chance, with house odds 1 to 6 is set up as follows: you roll two dice and win if 5 or 10 is the sum on the dice. It costs 25 cents to play.

a) What is the expected gain or loss on one play of this game?

b) If you play 40 times, how much do you expect to gain or lose overall?

(Final answers should have accuracy to 6 decimal places.)

1. (9pts) Every minute over the course of the hours 11AM-1PM, a bank employee counts the number of cars waiting in the drive-through bay. The table below shows his results.

- Draw a histogram representing the data.
- What is the mode of the data?
- What is the median of the data?
- What is the mean of the data?
- Find the standard deviation of the data.

Cars	Freq.
0	11
1	33
2	26
3	22
4	16
5	9
6	3

2. (6pts) Compute the following probabilities for a standard normal distribution. Draw a picture showing which area you are computing.

a) $P(-0.5 \leq Z \leq 0.33)$

b) $P(0.12 < Z)$

3. (7pts) An entrepreneur interested in opening a hot dog stand is surveying foot traffic at a small square downtown. The table below shows the number of people present on the square at noon over the course of 28 days. Do the following:

- a) Find the relative frequencies.
- b) Draw a pie chart for the data (find angles first).
- c) Enter a representative value for each interval.
- d) Estimate the mean of the data.

Range	Frequency	Rel. Freq.	Angle	Rep. value
0-5	8			
6-15	6			
16-25	7			
26-35	5			
36-50	2			

4. (8pts) According to the U.S. Bureau of the Census statistics, the ages of women who bore a child in 1992 were roughly normally distributed with mean 27.5 years old and a standard deviation of 6 years. Draw a picture showing which area you are computing as you answer:

- a) Of the women who bore a child in 1992, what percentage was between 30 and 34?
- b) Of the women who bore a child in 1992, what percentage was under 18?

1. (6pts) Suppose 80 votes are cast in an election among four candidates. After the first 45 votes are counted, the tallies are as follows: Nguyen 17, Hagarian 13, Xiang 8 and Perron 7.
- a) What is the minimal number of remaining votes Nguyen needs to be assured of a win?
 - b) What is the minimal number of remaining votes Xiang needs to be assured of a win?

2. (4pts) If 165 votes are cast, what is the smallest number of votes a winning candidate can have in a 3-candidate race decided by plurality?

3. (20pts) An ex-convicts' society is deciding on the primary object to appear in the society's logo. The preference rankings of the voters are shown below.

percentage of voters:	8	20	18	23	15	16
Barbed wire	1	1	2	3	2	3
Bars	2	3	1	1	3	2
Black sheep	3	2	3	2	1	1

- Which choice wins the vote in a plurality election?
- Which choice wins the vote in a plurality election with a runoff?
- Which choice is the Condorcet winner, if any?
- Which choice is the winner using Borda's method? Perform the check on the sum of Borda points.
- In the Borda election, could the 15% of voters from the fifth column achieve that their second choice wins by voting strategically, assuming all the other members voted as shown?