Practice Final Exam
Fall 2018

1) Your college newspaper, *The Collegiate Investigator*, has fixed production costs of $70 per edition and marginal printing and distribution costs of 40¢ per copy. *The Collegiate Investigator* sells for 50¢ per copy.

a) Write down the associated cost, revenue, and profit functions.

b) What profit (or loss) results from the sale of 500 copies of *The Collegiate Investigator*?

c) How many copies should be sold in order to break even?

2) Let $f(x) = x^2 + 3x + 1$

a) $f(0)$

b) $f(-1)$

c) $f(a)$

d) $f(x + h)$, simplify.

3) The XYZ Widget factory can produce 80 widgets in a day at a total cost of $8,000 and it can produce 100 widgets a day at a total cost of $10,000.

a) What are the company's daily fixed costs and marginal cost per widget?

b) Use the cost function to estimate the cost of manufacturing 400 widgets in a day.

4) The following table shows worldwide sales of a certain type of cell phones and their average wholesale process in 2014 and 2018.

Year	**2014**	**2018**
Selling Price ($)	325	245
Sales (millions)	1,110	1,910

a) Use the data to obtain a linear demand function for this type of cell phones.

$q(p) =$

b) Use your demand equation to predict sales to the nearest million phones if the price is raised to $375.

c) Fill in the blanks: For every $1 increase in price, sales of cell phones decrease by _____ units

5) The Better Baby Buggy Co. has just come out with a new model, the Turbo. The market research department predicts that the demand equation for Turbos is given by

$$q = -4p + 480,$$

where q is the number of buggies the company can sell in a month if the price is $\$p$ per buggy.

a) At what price should it sell the buggies to get the largest revenue?

b) What is the largest monthly revenue?

6) The half-life of cobalt 60 is 5 years.

a) Obtain an exponential model for cobalt 60 in the form $Q(t) = Q_0 e^{-kt}$. (Round coefficients to three significant digits).

b) Use your model to predict, to the nearest year, the time it takes for one third of the sample of cobalt 60 to decay.

7) The rate of auto thefts **triples** every 9 months.

a) Determine, to two decimal places, the base b for an exponential model $y = Ab^t$ of the rate of auto thefts as a function of time in months.

$b =$

b) Find the doubling time to the nearest tenth of a month.

8) There were 3,500 bacteria in a Petri dish (at time $t = 0$ hours). Four hours later, there were 5,500 bacteria in the dish. Find the mathematical model that represents the number of bacteria after t hours. It's an exponential formula of the form $Q(t) = Q_0 e^{kt}$.
Round k to 4 decimal places. Include the units in the answer.

9) Tom borrowed $2,000 from his father and agreed to pay a simple interest rate of 5.5%. After some time had passed, he paid his father $2,302.50. How long did it take Tom to pay back the loan, including interest?

10) Compute the simple interest *INT* for the specified length of time and the future value *FV* at the end of that time. Round all answers to the nearest cent.

$8,500 is invested for 4 months at 7% per year.

11) When I was considering what to do with my $10,000 lottery winnings, my broker suggested that I invest half of it in gold, the value of which was growing by 8% per

year, and the other half in certificates of deposit (CDs), which were yielding 4% per year, compounded every 6 months. Assuming that these rates are sustained, how much will my investment be worth in 13 years? (Round your answer to the nearest cent.)

12) Find the periodic withdrawals *PMT* for the given annuity account. Assume end-of-period withdrawals and compounding at the same intervals as withdrawals. Round your answer to the nearest cent.

$150,000 at 5%, paid out monthly for 13 years

13) You want to set up an education account for your child and would like to have $75,000 after 17 years. You find an account that pays 5.2% interest, compounded semiannually, and you would like to deposit money in the account every six months. How large must each deposit be in order to reach your goal? Round to the nearest dollar.

14) Find the amount accumulated *FV* in the given account. Assume end-of-period deposits and compounding at the same intervals as deposits. Round your answer to the nearest cent.

$350 is deposited monthly for 20 years at 2% per year

15) You own a hamburger franchise and are planning to shut down operations for the day, but you are left with 11 buns, 13 defrosted beef patties, and 7 opened cheese slices. Rather than throw them out, you decide to use them to make burgers that you will sell at a discount. Plain burgers each require 1 beef patty and 1 bun, double cheeseburgers each require 2 beef patties, 1 bun, and 2 slices of cheese, while regular cheeseburgers each require 1 beef patty, 1 bun, and 1 slice of cheese. How many of each should you make? **Show all of your work.**

16) Urban Community College is planning to offer courses in Finite Math, Applied Calculus, and Computer Methods. Each section of Finite Math has 40 students and earns the college $40,000 in revenue. Each section of Applied Calculus has 40 students and earns the college $60,000, while each section of Computer Methods has 10 students and earns the college $13,000. Assuming the college wishes to offer a total of six sections, accommodate 210 students, and bring in $253,000 in revenues, how many sections of each course should it offer?
Show all of your work.

17) Let $A = \{2, 5, 8, z, \$\}, B = \{5, \uparrow, z, 8, p\}$, and $C = \{2, z, 9, p, \Delta\}$. Find the following:

a) $A \cup (B \cap C)$

b) $(A \cup B) \cap C$

c) $A \cap (B \cup C)$

d) $A \cap (B \cap C)$

e) Find $n(A \times B)$

18) During a midnight showing of "Gone With the Wind", Tom noticed that there were 46 other people in the theater. He also noticed that all of these other people were either sleeping or wearing hats (or both). He counted 31 people sleeping and 24 wearing hats. How many people who were sleeping were also wearing hats?

19) The local diner offers a meal combination consisting of an appetizer, a soup, a main course, and a dessert. There are four appetizers, two soups, four main courses, and four desserts. Your diet restricts you to choosing between a dessert and an appetizer. (You cannot have both.) Given this restriction, how many three-course meals are possible?

20) Professor Easy's final examination has 9 true-false questions followed by 3 multiple-choice questions. In each of the multiple-choice questions, you must select the correct answer from a list of six. How many answer sheets are possible?

21) The following table shows the results of a survey of 200 authors by a publishing company.

	New Authors	**Established Authors**	**Total**
Successful	16	44	60
Unsuccessful	38	102	140
Total	54	146	200

Compute the relative frequency of the following events.

a) An author is successful and new.

b) An author is a new author.

c) A successful author is established.

d) An established author is successful.

e) An unsuccessful author is new

22) Suzan has a bag containing four red marbles, three green ones, two white ones, and one purple one. She grabs five of them. Find the probability of the following events, expressing each as a fraction in lowest terms.

a) She has none of the red ones.

b) She has at least one white one.

c) She has at most one green one.

d) She has two green ones and one of each of the other colors.

e) She has all the red ones.

23) Compute the indicated quantities:

a) $P(A|B) = .1, P(B) = .4.$ Find $P(A \cap B)$

b) $P(A|B) = .7, P(B) = .4.$ Find $P(A)$,(Assume A and B are independent)

c) $P(A) = .7, P(B) = .2.$ A and B are independent. Find $P(A \cap B)$