Math 131-03
Practice Questions for Exam# 2

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1) What is the effective rate that corresponds to a nominal rate of 20% compounded quarterly? 1) _____

2) How many years will it take for a principal to double at a rate of 10% compounded annually? Give your answer to the nearest year. 2) _____

3) To what sum will $1000 accumulate if it is invested at 10% compounded annually for one year and then at 10% compounded semiannually for two years? 3) _____

4) Over a period of 3 years, an original principal of $1000 accumulated to $1200 in an account where the interest rate was compounded monthly. Determine the rate of interest to two decimal places. 4) _____

5) At what nominal rate of interest, compounded quarterly, will money double in 10 years? 5) _____

6) An initial investment of $2600 grows at an annual rate of 7.5% compounded monthly. Find how long it takes for the investment to amount to $3500. 6) _____

7) An initial investment of $300 grows at an annual rate of 4.5% compounded bimonthly. Find how long it takes for the investment to amount to $450. 7) _____

8) Suppose an initial investment grows from $330 to $600 over five years. First find the nominal rate compounded monthly and then find the equivalent effective rate. 8) _____

9) The population of a small town is growing at an effective rate of 2.1%. If the current population is 53,000, what will the population be in 8 years? 9) _____

10) You have a choice of two banks. One bank pays interest at 5.54% compounded monthly and the other bank pays interest at 5.53% compounded daily (365 times a year). Which is the better choice? How much more would you make in one year if you deposited $1000? 10) _____

11) Determine the present value of $4000 due in 5 years if the interest rate is 10% compounded semiannually. 11) _____

12) Suppose you have the opportunity to invest $6000 in a business venture such that you will be repaid $8000 in five years. On the other hand, you can put the $6000 in a savings account that pays 5.25% compounded monthly. Which investment is better? 12) _____

13) Find the present value of $5000 due in 3 years if the interest rate is $6\frac{3}{4}$% compounded monthly. 13) _____

14) How much must be invested at an interest rate of 7.25% compounded quarterly to have $10,000 in two years? 14) _____

15) Suppose a person deposits $1000 in a savings account at the end of every six months. What is the value of the account at the end of five years if interest is at a rate of 10% compounded semiannually? 15) _____

16) To purchase land for an industrial site, a company agrees to pay $20,000 down and $10,000 at the end of every six-month period for 10 years. If the interest rate is 10% compounded semiannually, what is the corresponding cash value of the land? 16) _____

17) Suppose an annuity *due* consists of 6 yearly payments of $200 and the interest rate is 5% compounded annually. Determine (a) the present value and (b) the future value at the end of 6 years. 17) _____

18) Find the present value of an annuity of $200 per month for $7\frac{1}{2}$ years at an interest rate of 7% compounded monthly. 18) _____

19) A person establishes the following retirement plan: an immediate deposit of $10,000 in a savings account that earns 5% compounded annually; at the end of 21 years a withdrawal of x dollars and withdrawals of x dollars at the end of each year for the next nine successive years. Determine x. 19) _____

20) A rubber ball always bounces back $\frac{2}{3}$ of its previous height. If the ball is thrown up to a height of 30 feet, give the first five heights of the ball. 20) _____

21) A company earns a profit of $2000 in its first month. Suppose its profit increases by 10% each month for two years. Find the amount of profit the company earns in its sixth and sixteenth months. 21) _____

22) A company repays a $40,000 loan by paying 20% of the outstanding loan every four months for five years and then pays off the rest. How much was the company's final payment? 22) _____

23) $200 is invested at the rate of 6% compounded monthly for 5 months. List the compound amounts at the end of each month as a geometric sequence. 23) _____

24) What is the present value of an annuity of $1000 per month for ten years at an interest rate of 6.3% compounded monthly? 24) _____

25) A company repays a $50,000 loan by paying 10% of the outstanding loan each month. Find the amount the company pays in the fourth and twentieth months. 25) _____

26) After putting $10,000 down on a piece of property, a woman began paying $2500 a quarter for nine years. Given an interest rate of 7.75% compounded quarterly, how much would the property cost if the woman had paid for it in cash? 26) _____

27) If $5000 is used to purchase an annuity consisting of equal payments at the end of each month for the next $3\frac{1}{2}$ years and the interest rate is 6% compounded monthly, find the amount of each payment. 27) _____

28) The premiums on an insurance policy are $80 every six months, payable at the beginning of each six-month period. If the policy holder wishes to pay 1 year's premiums in advance, how much should be paid provided that the interest rate is 4.3% compounded semiannually? 28) _____

29) Suppose Lena deposits $500 at the end of every month into a bank account that pays 5.4% compounded monthly. After five years, how much will she have? 29) _____

30) If $1000 is deposited into a savings account that earns interest at an annual rate of 6% compounded continuously, find the value of the account at the end of seven years. Give your answer to the nearest dollar. 30) _____

31) Determine the effective rate equivalent to an annual rate of 10% compounded continuously. 31) _____

32) At an annual rate of 4% compounded continuously, in how many years would it take for a principal to double? 32) _____

33) In five years a company will purchase equipment costing $100,000. The company decides to place a single deposit into a savings account now so that its future value will equal the cost of the equipment. If the account earns interest at an annual rate of 10% compounded continuously, determine the deposit to the nearest dollar. 33) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

34) At an annual rate of 10% compounded continuously, the number of years in which a principal triples is 34) _____

A) $\frac{3}{\ln 0.10}$. B) $\frac{0.10}{\ln 3}$. C) $\frac{\ln 3}{0.10}$. D) $\frac{\ln 0.10}{3}$. E) $e^{0.30}$.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

35) A person deposits $1000 in a savings account that pays an interest rate of $4\frac{3}{4}$% compounded continuously. Find the balance in the account at the end of $3\frac{1}{2}$ years. 35) _____

36) In how many ways is it possible to answer a five-question multiple-choice examination if each question has three choices and exactly one choice is selected for each question? 36) _____

37) If a basketball league has five teams, how many different end-of-the-season rankings are possible? Assume that there are no ties. 37) _____

38) A manufacturer places a four-symbol code on each unit of a product. The first three symbols are numbers with the first not 0, and the fourth symbol is a letter other than o. How many codes are possible? 38) _____

39) Five different books are to be arranged horizontally on a bookshelf. (a) In how many ways can this be done? (b) If two are mathematics books and three are accounting books, in how many ways can all the books be arranged if the first two books are to be in mathematics? 39) _____

40) Determine the value of ${}_3P_3 \cdot {}_3C_3$ and simplify your answer. 40) _____

41) From a lot of ten computers, two are selected for extensive testing. In how many ways can the selection be made? 41) _____

42) How many distinguishable horizontal arrangements of all the letters in BOOKS are possible? 42) _____

43) From a committee of five men and four women, a subcommittee consisting of two men and two women is to be formed. In how many ways can the subcommittee be chosen? 43) _____

44) If a die is rolled and then a coin is tossed, and the results are observed, determine the sample space of this experiment. 44) _____

45) An urn contains four marbles, numbers 1, 2, 3, and 4. If a marble is drawn and then a coin is tossed, and the results are observed, determine the sample space of this experiment. 45) _____

46) If $S = \{1, 2, 3, 4, 5, 6\}$ is a sample space of an experiment with events $E = \{1, 3, 5\}$, $F\{4, 5, 6\}$, and $G = \{2, 4, 6\}$, find 46) _____
(a) $E \cup F$
(b) $E \cap G$
(c) $F \cap G'$
(d) Of the events E, F, and G, which pairs are mutually exclusive?

47) If $S = \{a, b, c, d, e, f, g\}$ is a sample space of an experiment with events $E = \{a, b, c\}$, $F = \{e, f, g\}$, and $G = \{a, c, d, g\}$, find 47) _____
(a) $E \cup F$
(b) $F \cap G$
(c) $(E \cup G)'$
(d) $E' \cap G$
(e) Of the events E, F, and G, which pairs are mutually exclusive?

48) Two light bulbs are selected from a box of 20 bulbs. For this experiment, how many sample points are in the sample space? 48) _____

49) A coin is tossed three times. Determine 49) _____
(a) the event E_1 that exactly two heads occur;
(b) the event E_2 that at least two heads occur;
(c) the event E_3 that no head occurs.

50) An urn contains ten marbles numbered 1 through 10. If a marble is randomly selected from the urn, determine the probability that it shows a number greater than or equal to 4. 50) _____

51) A fair coin is tossed and then a fair die is rolled. Determine the probability that 51) _____
(a) a head and an odd number show;
(b) a 2 or 4 shows.

52) Two cards are randomly drawn with replacement from a standard deck of 52 playing cards. Find the probability that 52) _____
(a) both cards are aces;
(b) the first card is red and the second card is a club;
(c) one card is red and the other is a club.

53) An urn contains two red and three green marbles. Two marbles are randomly drawn in succession without replacement. Determine the probability that 53) _____
(a) the first marble is red and the second is green;
(b) both marbles are red.

54) If $P(E) = 0.3$, $P(F) = 0.4$, and $P(E \cap F) = 0.2$, find $P(E \cup F)$. 54) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

55) If a pair of dice are rolled, the probability that the sum of the numbers of dots appearing is 5 is 55) _____
A) $\frac{1}{18}$. B) $\frac{1}{3}$. C) $\frac{5}{36}$. D) $\frac{1}{9}$. E) $\frac{1}{12}$.

56) If a pair of dice are rolled, the probability that the sum of the numbers of dots appearing is 9 or 10 is 56) _____
A) $\frac{1}{9}$. B) $\frac{7}{36}$. C) $\frac{5}{36}$. D) $\frac{1}{18}$. E) $\frac{1}{6}$.

57) Two marbles are randomly drawn in succession without replacement from an urn that contains 10 red marbles and 10 green marbles.The probability that one marble is red and the other is green is 57) _____

A) $\frac{10}{19}$. B) $\frac{1}{2}$. C) $\frac{1}{4}$. D) $\frac{5}{19}$. E) $\frac{1}{20}$.

58) If a pair of dice are rolled, the probability that the sum of the numbers of dots appearing is *not* 4 is 58) _____

A) $\frac{7}{12}$. B) $\frac{8}{9}$. C) $\frac{11}{12}$. D) $\frac{1}{9}$. E) $\frac{2}{3}$.

59) Each question on a four-question multiple-choice examination has three choices, only one of which is correct. By answering each question in a random fashion, the probability that exactly two questions are answered correctly is 59) _____

A) $\frac{11}{27}$. B) $\frac{1}{6}$. C) $\frac{2}{27}$. D) $\frac{8}{27}$. E) $\frac{1}{2}$.

60) If $P(E) = 0.4$, $P(E \cup F) = 0.6$, and $P(E \cap F) = 0.1$, find $P(F')$. 60) _____

A) 0.7 B) 0.5 C) 0.6 D) 0.4 E) 0.3