King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Math 131-01 Final Exam

Name:.....ID.....

Show all your work
(no mark will be given otherwise)

1. The effective rate that corresponds to a nominal rate of 20% compounded quarterly is

   a) 22.55% b) 20.5% c) 21.50% d) 19.5% e) 21.55%

2. An initial investment of \$4000 grows to \$4884 in five years. The nominal rate of interest, compounded monthly that was earned by the money, is

   a) 4.2% b) 3.5% c) 4% d) 3.8% e) 5.1%

3. An initial investment of \$2600 grows at an annual rate of 7.5% compounded monthly. The investment amounts to \$3500 in

   a) 4.5 years b) 3 years c) 4 years d) 5 years e) 3.9 years

4. A bank pays 4% annual interest compounded quarterly. The deposit that must be made now in order that the account contains \$1500 at the end of three years, should be

   a) \$1200.55 b) \$1302.31 c) \$1331.17 d) \$997.50 e) \$1412.52

5. Suppose \$500 is initially placed in a savings account that earns interest at the rate of 8% compounded semiannually. Thereafter, \$500 is deposited in the account at the end of every six months for five years. The value of the account at the end of these five years is

   a) \$4055.45 b) \$6799.78 c) \$6003.05 d) \$6743.18 e) \$4555.45

6. A man purchased a new laser printer for his computer for \$1100 and agreed to pay off the loan by making monthly payments of \$59. If the store charges an interest rate of 12.2% compounded monthly, the number of months needed to pay off the debt is

   a) 19 b) 12 c) 23 d) 21 e) 24

7. If a pair of dice are rolled, the probability that the sum of the number of dots appearing is 5 is

   a) $\frac{5}{36}$ b) $\frac{1}{9}$ c) $\frac{1}{3}$ d) $\frac{1}{12}$ e) $\frac{1}{18}$

8. A biased coin is tossed 8 times. If the probability of heads appearing on any toss is $\frac{1}{3}$, then the probability that exactly six heads appear is

   a) $\frac{2}{3^8}$ b) $\frac{56}{3^8}$ c) $\frac{224}{3^8}$ d) $\frac{112}{3^8}$ e) $\frac{100}{3^8}$

9. Suppose X is a uniformly distributed continuous variable over the interval $[2, 7]$, $P(X > 5)$ is equal to

   a) 0.7 b) 0.4 c) 0.5 d) 0.3 e) 0.6

10. The life (in hours) of light bulbs of a certain brand is normally distributed with mean 1200 and standard deviation 100. The percentage of such bulbs will burn more than 1250 hours is

    a) 20.47 b) 41.73 c) 48.26 d) 13.62 e) 30.85

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

12. If $P(E) = \frac{1}{3}$, $P(F) = \frac{2}{5}$ and $P(E \cap F) = \frac{1}{5}$ find $P(E|F)$.

13. If a fair red die and a fair green die are rolled, find the probability that the sum is greater than 8, given that a 4 shows on the red die.

14. If $P(E|F) = \frac{1}{2}$, $P(E \cup F) = \frac{9}{10}$ and $P(E \cap F) = \frac{2}{5}$, determine if E and F are dependent or independent.

15. A random variable X has a distribution given by $f(1) = 0.5$, $f(2) = 0.2$, $f(3) = k$. Find a numerical value for the mean and the variance

16. A fair die is rolled four times. What is the probability that exactly three 2's appear?

17. If X is a normal random variable with $\mu = 16$ and $\sigma = 2$, determine the Z value that corresponds to $X = 23$.

18. If X is normally distributed with $\mu = 25$ and $\sigma = 5$, find $P(20 \leq X \leq 35)$

19. Suppose X has a binomial distribution with $n = 100$ and $p = \frac{9}{25}$. Using the normal approximation of the binomial distribution, find (a) $P(X \geq 26)$.

20. A company has two different locations to assemble different models of PCs. The table below summarizes the daily production capacity, the minimum number of each type needed, and the daily operating costs for each location.

	Location 1	Location 2	Minimum Number
Model 1	60/day	60/day	2400
Model 2	40/day	80/day	2000
Model 3	60/day	40/day	1800
Weekly Cost	\$16000	\$12000	

Find the number of days/weeks that each location needs to operate in order to fill the orders at minimum cost.

21. Use the simplex method to

$$\text{Maximize} \quad Z = x_1 + 4x_2 + x_3 \qquad \text{subject to} \quad \begin{cases} x_1 + x_2 + x_3 \leq 6 \\ x_1 - x_2 - 2x_3 \leq 2 \\ x_1, x_2, x_3 \geq 0 \end{cases}$$

22. Use the dual and the simplex method to

$$\text{Minimize} \quad Z = 4x_1 + 5x_2 \qquad \text{subject to} \quad \begin{cases} x_1 - x_2 \geq 4 \\ 2x_1 - x_2 \geq 1 \\ 5x_1 + 3x_2 \geq 3 \\ x_1, x_2 \geq 0 \end{cases}$$