Math 323 FINAL

1. Two dice are rolled. The probability that the product of the dots is 6 is

a. $\frac{1}{9}$ b. $\frac{1}{6}$ c. $\frac{5}{36}$ d. $\frac{1}{36}$ e. $\frac{5}{24}$

2. A coin is flipped. If it comes up heads then two dice are rolled; if tails then three dice are rolled. If X is the number of dots shown, then P (X = 18) is

a. 0.004 b. 0.013 c. 0.002 d. 0.003 e. 0.001

3. If E and F are mutually exclusive events such that $P(E) = \frac{1}{2}$ and $P(F) = \frac{1}{3}$ then P(EUF) =

a. $\frac{5}{6}$ b. $\frac{1}{3}$ c. $\frac{1}{6}$ d. $\frac{1}{5}$

e. not enough information

4. Let P (EUF) = 0.7 and P(E) = 0.3. If E and F are independent then P(F) =

a. 0.571 b. 0.413 c. 0.600 d. 0.713

e. not enough information

5. In the senior class of a high school 140 of 300 students are male. 80% of male students have driver's licenses and 60% of females have driver's licenses. A student is picked at random and has a license. The probability that the student is male is

a. $\frac{7}{13}$ b. $\frac{52}{75}$ c. $\frac{28}{75}$ d. $\frac{7}{15}$ e. $\frac{5}{11}$

6. A person holds 14 playing cards in her hand and notes that six are clubs and eight are diamonds. Her daughter picks five of these cards at random. What is the probability that four clubs were chosen, given that at least one club was chosen?

a. 0.062 b. 0.064 c. 0.060 d. 0.067 e. 0.053

7. A ball is selected from a box of 100 balls, 40 of which are white and 60 red. This is repeated 20 times with replacement. If X is the number of white balls drawn what is P ($x > 8$)? (Use table in text)

a. 0.404 b. 0.500 c. 0.612 d. 0.321 e. 0.297

8. In problem 7 suppose that the experiment is conducted without replacement. If X is the number of white balls drawn, what is the value of E(X)?

a. 2 b. 4 c. 8 d. 6 e. 5

9. A person draws cards with replacement from a standard poker deck (52 cards). What is the probability that the first time a heart is drawn is on the fifth draw?

a. 0.079 b. 0.063 c. 0.092 d. 0.103 e. 0.250

10. A person is shopping for an item which is stocked at only 40% of the stores in his vicinity. What is the probability that he will need to visit ten stores before he finds three that have the item?

a. .065 b. .058 c. 0.71 d. 0.043 e. 0.26

11. The clerk at the Customer Service desk at a department store notes that 3 people show up per hour on the average. What is the probability that 25 or more show up in an 8 hour day? (Use table in text)

a. 0.446 b. 0.553 c. 0.612 d. 0.346 e. 0.801

12. A random variable has probability density function

$$f(x) = \begin{cases} x^2 & \text{if } 0 \le x < 1 \\ \frac{2}{3} & \text{if } 1 \le x \le 2 \\ 0 & \text{elsewhere} \end{cases}$$

The value of E(X) is

a. 1.25 b. 2.00 c. 3.15 d. 0.98 e. 2.35

13. Trucks pass an intersection at the rate of 3 each minute. What is the standard deviation for the waiting time between trucks?

a. $\frac{1}{3}$ b. $\frac{1}{9}$ c. $\frac{2}{3}$ d. $\frac{3}{5}$ e. $\frac{1}{5}$

14. Let X_1 and X_2 have gamma distribution with $\alpha_1 = 7$, $\beta_1 = 2$; $\alpha_2 = 2$, $\beta_2 = 2$ respectively. Let $Y = X_1 + X_2$.
By use of Tchebycheff's inequality find the lower bound for the probability

$P (6 \le Y \le 30)$

a. 0.75 b. 0.25 c. 0.89 d. 0.67 e. 0.33

15. Random variables X_1 and X_2 have joint probability density function $f(x_1, x_2) = \frac{20}{7}(x_1 + x_2)$ for $0 \le x_2 \le x_1^2 \le 1$
0 elsewhere

The marginal probability density $f_1(x_1)$ is

a. $\frac{20}{7}\left(x_1^3 + \frac{x_1^4}{2}\right)$ b. $20\left(x_1 + \frac{x_1^2}{7}\right)$ c. $\frac{20}{7}\, x_1\left(x_1 + \frac{x_1^2}{4}\right)$

d. $20 + \frac{x_1^2}{7}$ e. $\frac{20}{7} + x_1^2$

16. If X is normal with mean 250 and standard deviation 100 find the probabilty that $X \geq 312$

a. 0.2676 b. 0.1913 c. 0.3150 d. 0.2411 e. 0.6138

17. If X is normal with mean 100 and standard deviatioin 12 locate the 95th percentile (ie. value of x_o such that $P(X < x_o) = .95$) to the nearest whole number.

a. 120 b. 117 c. 105 d. 131 e. 142

18. A special power supply has lifetime in years which follows a Weibull distribution with $\gamma = 3$ and $\theta = 5$. What is the probability that it is still working after two years?

a. 0.2018 b. 0.1131 c. 0.2236 d. 0.3119 e. 0.1732

19. A continouous random variable X has distribution function F given by

$$F(t) = \begin{cases} 0 & \text{if } t < 0 \\ 3t^2 - 2t^3 & \text{if } 0 \le t \le 1 \\ 1 & \text{if } t \ge 1 \end{cases}$$

The probability density function for X is f (x) =

a. $6x(1-x)$ $0 \le x \le 1$ b. $x + 2x^3$ $0 \le x \le 1$

c. $\frac{5}{3}x + \frac{x^2}{2}$ $0 \le x \le 1$ d. $6x^2 - 2x$ $0 \le x \le 1$

e. $5x^3 - \frac{3}{4}x^2$ $0 \le x \le 1$

20. Let X_1 and X_2 have joint probability density function

$$f(x_1, x_2) = 6x_1 x_2^2 \quad 0 \le x_1 \le 1, 0 \le x_2 \le 1$$
$$0 \text{ elsewhere}$$

Then $f_2(x_2) =$

a. $3x_2^2$ b. $2x_2$ c. $3x_1^2 x_2^2$ d. $3x_2^4$ e. 3

21. The random variables of the preceding problem are

a. independent b. dependent

Reason for answer _____

22. Let $f(x_1, x_2) = \frac{1}{4}(2x_1 + x_2)$ for $0 \le x_1 \le 1$, $0 \le x_2 \le 2$
0 elsewhere.

Then $P(X_2 \le 1 | X_1 = \frac{1}{2}) =$

a. 0.375 b. 0.625 c. 0.429 d. 0.571 e. 0.333

23. Let $f(x_1, x_2) = x_1 + x_2$ for $0 \le x_1, 0 \le x_2 \le 1$
0 elsewhere
Then $P(X_1 + X_2 \le 1) =$

a. $\frac{1}{3}$ b. $\frac{1}{4}$ c. $\frac{1}{24}$ d. $\frac{1}{12}$ e. $\frac{2}{3}$

	X_2	
X_2	0	1
0	0.1	0.3
1	0.2	0.1
2	0.1	0.2

24. Using the table of values of $p(x_1, x_2)$ given above find cov (X_1, X_2)

a. – 0.04 b,. 0.12 c. – 0.12 d. –0.04 e. 1.35