Math 17300	**Name (Print):**	_____
Thursday, May 21, 2026 **Final Exam**	**Section:**	PR
Spring 2026	**emplID:**	_____

READ: This final exam is cumulative and covers the following sections: Chapter 2: *Descriptive Statistics* (2.1, 2.2), Chapter 3: *Descriptive Statistics* (3.1, 3.2), Chapter 4: *Probability* (4.1, 4.2, 4.3, 4.4, 4.5), Chapter 5: *Discrete Probability Distributions* (5.1, 5.2, 5.4), Chapter 6: *Normal Probability Distributions* (6.1, 6.2, 6.3, 6.4, 6.5), Chapter 7: *The Central Limit Theorem* (7.1, 7.2, 7.3), Chapter 8: *Confidence Intervals* (8.1, 8.2, 8.3, 8.4), Chapter 9: *Confidence Intervals for Two Samples* (9.1, 9.2, 9.4), and Chapter 12: *Correlation and Regression* (12.1, 12.2, 12.3).
The exam has 15 pages, including this cover page, and 24 questions. You will also be handed separate tables for statistics tables and formulas. **Check now** for any missing pages. Write your name and emplID clearly on the cover page.
This exam has **multiple choice questions** and long answer questions. For each question, select the best answer choice. Write in Capital letter on the box your final answer. The following rules apply:

- Choose **one** answer for each question, unless the question explicitly says otherwise.
- If calculations are needed, round your answer to **three** decimal places unless the question gives different instructions.
- You may use the space on the exam pages for scratch work, but scratch work will **not** be graded.
- Make sure your final selected answer is clear. Ambiguous, crossed-out, or unclear selections may receive no credit.
- If no answer is selected for a question, that question receives 0 points.

1. (3 points) Which statement best describes the **Central Limit Theorem**?

   A. For any given population with mean μ and standard deviation σ, the population distribution will approach a normal distribution as the sample size increases. Furthermore, the larger the sample size, the better the approximation will be.

   B. For any given population with mean, μ, and standard deviation, σ, the shape of the sampling distribution of sample means will approach that of a normal distribution as the sample size increases. Consider a sample size to be large enough if $n \geq 30$, as is common practice. Furthermore, the larger the sample size, the better the normal distribution approximation will be.

   C. For any given population with mean μ and standard deviation σ, the shape of the sample data will approach that of a normal distribution as the sample size increases.

   D. For any given population, the sampling distribution of sample means is always exactly normal regardless of the sample size.

2. (3 points) A researcher studies the relationship between the number of hours students study for an exam and their exam scores. The correlation coefficient is $r = 0.942$. Which statement best describes this value?

   A. There is a weak negative linear relationship between hours studied and exam scores.

   B. There is a strong positive linear relationship between hours studied and exam scores.

   C. There is no linear relationship between hours studied and exam scores.

   D. The exam score increases by exactly 0.942 points for every additional hour studied.

3. (3 points) There are seven yellow marbles and nine green marbles in a bag. If five marbles are chosen at random **without replacement**, what is the probability that exactly three of the marbles chosen are yellow?

A. 0.144

B. 0.219

C. 0.288

D. 0.500

4. (3 points) Let X be normally distributed with mean $\mu = 70$ and standard deviation $\sigma = 10$. What is the probability that X is less than 85?

A. 0.0668

B. 0.4332

C. 0.9332

D. 1.5000

5. (3 points) A binomial random variable has $n = 100$ and $p = 0.60$. Which normal distribution should be used to approximate this binomial distribution?

A. $\mu = 100$ and $\sigma = 0.60$

B. $\mu = 60$ and $\sigma = 60$

C. $\mu = 60$ and $\sigma = \sqrt{100(0.60)(0.40)}$

D. $\mu = 40$ and $\sigma = \sqrt{100(0.60)(0.40)}$

6. (3 points) The weights of adult dogs in a city have mean $\mu = 42$ pounds and standard deviation $\sigma = 12$ pounds. A random sample of $n = 36$ dogs is selected. What are the mean and standard deviation of the sampling distribution of the sample mean $\bar{x}$?

A. $\mu_{\bar{x}} = 42$ and $\sigma_{\bar{x}} = 12$

B. $\mu_{\bar{x}} = 42$ and $\sigma_{\bar{x}} = \dfrac{12}{\sqrt{36}} = 2$

C. $\mu_{\bar{x}} = 36$ and $\sigma_{\bar{x}} = \dfrac{42}{\sqrt{12}}$

D. $\mu_{\bar{x}} = 42$ and $\sigma_{\bar{x}} = \sqrt{36(12)}$

7. (3 points) María is packing her suitcase to go to Providence. She wants to pack 4 shirts, 2 pairs of pants, 2 dresses, and 2 pairs of high heels. She has 10 shirts, 6 pairs of pants, 4 dresses, and 5 pairs of high heels to choose from. How many ways can María pack her suitcase?

A. 241

B. 189000

C. 1200

D. 190512000

8. (3 points) Emily is apartment hunting in Tribeca. Her real estate app shows 20 available apartments with the following features:

   - Near a subway station: 8 apartments
   - Under \$5,000 per month: 9 apartments
   - Has a rooftop hangout space with a hot tub with a view of the city: 6 apartments
   - Recently renovated: 4 apartments
   - Near a subway station AND under \$5,000: 3 apartments
   - Has a rooftop space with a hot tub with a view of the city AND recently renovated: 2 apartments

   If Emily randomly schedules a viewing for one of these apartments, what is the probability that the apartment is either near a subway station or under \$5,000 per month?

   A. $P(\text{subway or under \$5000}) = \dfrac{17}{20} = 0.850$

   B. $P(\text{subway or under \$5000}) = \dfrac{14}{20} = 0.700$

   C. $P(\text{subway or under \$5000}) = \dfrac{20}{20} = 1.000$

   D. $P(\text{subway or under \$5000}) = \dfrac{3}{20} = 0.150$

9. (3 points) As of May 2026, the average rent for an apartment in Pasadena, California was reported to be about \$2334 per month. Suppose that the standard deviation of rent prices is \$450.

   Assuming rent prices are approximately normally distributed, what percentage of rent prices are between \$984 and \$3684?

   A. Approximately 68%

   B. Approximately 95%

   C. Approximately 99.7%

   D. Approximately 50%

10. (3 points) How many different ways can you arrange the letters in the word **MISSISSIPPI**?

A. 39916800

B. 1663200

C. 34650

D. 831600

11. (3 points) Samantha is planning a Saturday afternoon in Brooklyn. Her plan has three stops:

- 1 coffee shop
- 1 museum or gallery
- 1 place for dinner

She is choosing between:

- 5 coffee shops
- 4 museums or galleries
- 6 dinner places

How many different Saturday afternoon combinations can Samantha create?

A. 15

B. 24

C. 120

D. 240

12. (3 points) A professor surveys a class of 40 students and records each student's favorite type of music. The professor wants to show what **percentage of the class** chose each music category: salsa, hip-hop, rock, pop, and classical. Which graphical display would be most appropriate?

A. Histogram

B. Scatter plot

C. Pie chart

D. Box plot

13. (3 points) In a random sample of 200 students, 124 said they drink coffee at least once per week. Which expression gives the sample proportion $\hat{p}$?

A. $\hat{p} = 1.613$

B. $\hat{p} = 0.620$

C. $\hat{p} = 0.380$

D. $\hat{p} = 1.632$

14. (3 points) A student guesses on 6 multiple-choice questions. Each question has 4 answer choices, and only one answer choice is correct. Let X be the number of questions the student guesses correctly. What is the probability that the student guesses exactly 2 questions correctly?

A. 0.004

B. 0.297

C. 0.033

D. 0.020

15. (3 points) A survey asked students at two colleges whether they prefer online classes. At College A, 80 out of 200 students said yes. At College B, 90 out of 150 students said yes. What is the point estimate for the difference of two population proportions, $p_A - p_B$?

A. 0.486

B. -0.200

C. 0.200

D. 0.083

16. (3 points) A 99% confidence interval for the true difference between the mean number of bird species observed by participants in guided walks and those who bird-watched independently is

$$(10.797,\ 17.203).$$

Which statement is the best interpretation of this confidence interval?

A. We are 99% confident that guided-walk participants observed between 10.797 and 17.203 bird species total.

B. We are 99% confident that guided-walk participants observed, on average, between 10.797 and 17.203 more bird species than independent bird-watchers.

C. There is a 99% probability that the sample mean difference is between 10.797 and 17.203 bird species.

D. We are 99% confident that independent bird-watchers observed, on average, between 10.797 and 17.203 more bird species than any participant.

17. (3 points) The following regression model was created using monthly temperature and precipitation data from Key West, Florida:

Average Temperature (°F)	Precipitation (in.)
75	2.22
76	1.51
79	1.86
82	2.06
85	3.48
88	4.57
89	3.27
90	5.40
88	5.45
85	4.34
81	2.64
77	2.14

$$\hat{y} = -15.424 + 0.225x,$$

where x is the average monthly temperature in degrees Fahrenheit and $\hat{y}$ is the predicted monthly precipitation in inches.

Is it appropriate to use this model to predict the monthly precipitation in Destin, Florida, for a month in which the average temperature is 83°F?

A. Yes, because 83°F is within the range of temperatures in the Key West data.

B. Yes, because the correlation coefficient was statistically significant.

C. No, because the model was created using data from Key West, not Destin.

D. No, because 83°F is outside the range of temperatures in the Key West data.

18. (3 points) Refer to the Key West regression model given in the previous question.

    What does the slope of 0.225 mean in this context?

    A. For each additional inch of precipitation, the average temperature is predicted to increase by 0.225°F.

    B. For each additional degree Fahrenheit in average temperature, the predicted monthly precipitation increases by about 0.225 inches.

    C. When the average temperature is 0°F, the predicted precipitation is 0.225 inches.

    D. The monthly precipitation is predicted to be exactly 0.225 inches for every month.

19. (3 points) A researcher wants to estimate the mean amount of money students spend on textbooks in a semester. From previous studies, the population standard deviation is known to be $\sigma = \$80$.

    What is the minimum sample size needed to estimate the true mean textbook cost within \$20 with 95% confidence?

    A. 8

    B. 62

    C. 61

    D. 16

20. (3 points) A small coffee shop records the number of pastries sold to randomly selected customers. The probability distribution is shown below.

x	0	1	2	3
$P(x)$	0.10	0.35	0.40	0.15

What is the expected number of pastries sold to a randomly selected customer?

A. 1.50

B. 1.60

C. 1.65

D. 2.00

21. (10 points) The following data set gives the number of hours that 8 students studied for an exam:

4, 6, 2, 8, 5, 5, 7, 3

(a) Fill out the frequency table for the data.

Hours Studied	**Frequency**
2	
3	
4	
5	
6	
7	
8	

Use the data set to find each value below. Show your work in the space to the right and below, and write your final answer clearly in the table. Round the sample standard deviation to three decimal places.

Quantity	**Final Answer**
Mean	
Median	
Range	
Sample standard deviation	

22. (10 points) A student records the repair costs for 20 randomly selected computers from a local repair shop where he works. A sample mean of \$216.53 and standard deviation of \$15.86 are subsequently computed. Assume that the population distribution is approximately normal and σ is unknown. Determine the 98% confidence interval for the mean repair cost for all computers repaired at the local shop.

Interpretation:

23. (10 points) A researcher studies the relationship between the number of hours students spend studying each week and their final exam scores. For a sample of $n = 12$ students, the correlation coefficient is $r = 0.620$. Determine whether the linear relationship is statistically significant at the $\alpha = 0.05$ level of significance. Write a conclusion in context.

24. (10 points) As adults, our body temperatures are normally distributed with a mean of 98.6°F and a standard deviation of 0.73°F. Answer the following:

    A. What percentage of healthy adults have a body temperature between 98°F and 99°F?

    B. What percentage of healthy adults have either a body temperature greater than 100°F or less than 97°F?

    C. What is the probability that a healthy adult has a body temperature that differs from the mean by more than 1°F?

Final answers

A. _____

B. _____

C. _____