MAT 108: Exam 2 **Name:** _____
Fall – 2023
11/09/2023
85 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains 8 pages (including this cover page) and 7 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work. If you run out of room for an answer, continue on the back of the page — being sure to indicate the problem number.

Question	Points	Score
1	10	
2	15	
3	15	
4	15	
5	15	
6	15	
7	15	
Total:	100	

1. (10 points) You have purchased a race horse called Elmer G. The previous owner claims that in a race there is a $\frac{1}{14}$ chance he will come in first, a $\frac{2}{14}$ chance that he will come in second, and a $\frac{4}{14}$ chance that he will come in third. You can enter the horse in a race at a local track for \$800. The race has a \$3,000 prize for first place, a \$2,000 prize for second place, and a \$1,000 prize for third place.

   (a) Find the probability that the horse does not come in first, second, or third place.

   (b) Find the expected payout for entering the horse in this race.

   (c) Using your answer from (b), should you enter your horse in this race?

2. (15 points) ClikClok is a popular video app among teens. Math teachers everywhere want to know how much time teens spend on the app instead of learning the quadratic formula. A coterie of teachers surveys a simple random sample of 55 teens and finds that they spend on average of 4.5 hours on the app per day.

   (a) Assuming that the standard deviation for app usage time is 1.5 hours per day, construct a 90% confidence interval for the average amount of time teens spend on the app per day.

   (b) How many teens would the teachers have to survey to estimate the average usage time with an error of at most 15 minutes?

3. (15 points) A 'professional' social media influencer is looking to start a cryptocurrency to play off the success of dogecoin. The finfluencer will also use a popular meme as the basis for their digital coin. To determine which meme to use, the self-employed media 'star' selects a few popular memes and takes a survey to determine whether people from various age groups recognize the meme. The results are given below.

	12–17	18–21	22–30	31+	Total
Success Baby	8	9	19	37	73
Ermahgerd Girl	4	5	16	29	54
Grumpy Cat	12	16	16	39	83
Distracted Boyfriend	8	24	37	40	109
Evil Kermit	3	10	24	39	76
Total	35	64	112	184	395

(a) Find the probability that a randomly selected surveyed person was between 18 and 21.

(b) Find the probability that a randomly selected surveyed person knew the grumpy cat meme.

(c) Find the probability that a randomly selected surveyed person was 18 to 21 or knew the grumpy cat meme.

(d) Find the probability that a randomly selected surveyed person knew the ermahgerd girl meme, if they were over 30.

(e) Find the probability that a randomly selected surveyed person was under 18 and knew the evil kermit meme.

4. (15 points) Not only did Peter Piper pick a peck of pickled peppers, the peck of pickled peppers that Peter Piper picked had peppers whose weights were normally distributed with mean 126 g and standard deviation 13 g.

   (a) Find the percentage of peppers picked that weighted more than 130 g.

   (b) Find the percentage of peppers picked that weighted between 100 and 130 g.

   (c) What is the minimum weight of a pepper needed to be in the top 9% of weights of picked peppers?

5. (15 points) Stella the statistician swiftly surveyed sixteen scattered colleagues. Asked about whether they owned vans or diagrams, the summoned sensible statisticians swiftly shared their selected, simple responses: 10 of them owned a van, 8 of them owned a diagram, and 3 of them owned both.

   (a) Find the probability that a randomly selected surveyed statistician owned only a van.

   (b) Find the probability that a randomly selected surveyed statistician owned a van or a diagram.

   (c) Find the probability that a randomly selected surveyed statistician owned neither a van nor a diagram.

   (d) Find the probability that a randomly selected surveyed statistician owned a van, if they owned a diagram.

6. (15 points) A vendor of a cologne called Sexy Jaguar claims that 20% of the time 'it works' (every time). Suppose you use the cologne 11 times.

   (a) Find the probability that the cologne works exactly 5 times.

   (b) Find the probability that the cologne works less than 3 times.

   (c) Find the probability that the cologne works at most 4 times.

   (d) Find the probability that the cologne works at least once.

7. (15 points) When you play Monopoly with friends, you only win 40% of the time. If you lose, you flip the board 90% of the time in fury. Even if you win, you flip the board in celebration 15% of the time.

   (a) Find the probability that you flip the board playing Monopoly.

   (b) Find the probability that you do not flip the board playing Monopoly.

   (c) Find the probability that you flip the board or win playing Monopoly.

   (d) Find the probability that if you flipped the board, you had won the game.