# Math 130 Sample Exam 4

(Note that the actual exam will have 24 questions.)

1) Kansas used three letters (excluding Q and X) followed by three digits on license plates. How many license plates are possible?
   A) 14,824
   B) 39,304
   C) 13,824,000
   D) 17,576,000
   E) None of the above.

*So 26−2 = 24 options     10 options*

$$24 \cdot 24 \cdot 24 \cdot 10 \cdot 10 \cdot 10 = 13,824,000$$

2) A special menu offers a choice of 2 appetizers, 3 main dishes, 4 desserts, and 3 drinks. How many combinations are possible?
   A) 72
   B) 12
   C) 18
   D) 15
   E) None of the above.

$$2 \cdot 3 \cdot 4 \cdot 3 = 72$$

Use the following to answer questions #3- #5

At Ice Cream Palace they have a sundae bar.  The options are as follows:

**Ice Cream:**  chocolate, vanilla, strawberry, butter pecan *(4)*

**Sauce:**  hot fudge, caramel, strawberry sauce, pineapple sauce *(4)*

**Topping:**  rainbow sprinkles, whipped cream, none *(3)*

**Nuts:**  walnuts, almonds, none *(3)*

3) How many different sundaes are possible?
   A) 48
   B) 144
   C) 14
   D) 96
   E) None of the above.

$$4 \cdot 4 \cdot 3 \cdot 3 = 144$$

4) How many sundaes have strawberry ice cream and pineapple sauce?
   A) 9
   B) 12
   C) 2
   D) 6
   E) None of the above.

$$1 \cdot 1 \cdot 3 \cdot 3 = 9$$

5) What is the probability that someone ordering at random will order a sundae with almonds?
   A) 48
   B) 0.33
   C) 0.25
   D) 0.5
   E) None of the above.

$$\frac{4 \cdot 4 \cdot 3 \cdot 1}{4 \cdot 4 \cdot 3 \cdot 3} = \frac{1}{3} \approx 0.33$$

6) What is the probability of rolling a 7 on a ten-sided die AND an 11 on a 12-sided die?
   A) 72/120
   B) 1/18
   C) 1/77
   D) 11/60
   E) 1/120

*1/10          1/12*

$$\frac{1}{10} \cdot \frac{1}{12} = \frac{1}{120}$$

7) Three coins are tossed. What is the probability of getting exactly 2 tails OR 2 heads?
   A) 1/8
   B) 3/4
   C) 9/64
   D) 1/2
   E) None of the above.

Sample Space: {HHH, HHT, HTH, THH, TTH, THT, HTT, TTT}

$$n = 2^3 = 8$$

$$\frac{3}{8} + \frac{3}{8} = \frac{6}{8} = \frac{3}{4}$$

8) What is the probability of drawing a face card (jack, queen, king) from a well-shuffled, standard deck of 52 cards?
   A) 0.231
   B) 0.058
   C) 0.115
   D) 12
   E) None of the above.

*Handwritten: $3 \times 4$ suits = 12 face cards*  $\frac{12}{52} = .23077$  $\approx .231$

9) The odds that Thundercat will win the next race are 4 to 9. What is the probability that Thundercat will win?
   A) 0.44
   B) 2.25
   C) 0.31
   D) 0.69
   E) None of the above.

*Handwritten: ways to win → ways to lose;  $4+9$ = total outcomes;  $\frac{4}{13}$ = prob. Thundercat wins.  $\frac{4}{13} \approx .30769 \approx .31$*

10) There is a 3 in 10 chance that Miss Fancy Buttons will win the last race. What are the odds that Miss Fancy Buttons will win?
    A) 3 to 10
    B) 10 to 3
    C) 3 to 7
    D) 7 to 3
    E) None of the above.

*Handwritten: 10 total outcomes, 3 ways to win  odds: 3 to 7;  $10-3 = 7$ ways to lose.*

11) The odds that Pom-Pom will win the next race are 7 to 2. What is the probability that Pom-Pom does NOT win?
    A) 7/2
    B) 2/7
    C) 9/7
    D) 2/9
    E) None of the above.

*Handwritten: 7 ways to win, 2 ways to lose.  $7+2 = 9$ ways total;  $\frac{2}{9}$  ways to lose / total outcomes*

12) You have $550 to invest. If you put it in the Smart Fund there is a 27% chance that it will increase in value by $80 within a year, but there is a 73% chance that it will decrease in value by $100. What is your expected gain or loss from an investment in the Smart Fund?
    A) $51.40 gain
    B) $51.40 loss
    C) $21.60 gain
    D) $21.60 loss
    E) None of the above.

*Handwritten: $27\%(80) + 73\%(-100)$;  $.27(80) - .73(100) = -51.4$;  $51.40$ loss*

13) Calculate the grade a student should receive if quizzes are worth 30% of the final grade, homework worth 30% and exams worth 40%. The quiz average is 88%, homework average is 95% and exam average is 79%.

    A) 28.8%
    B) 85.25%
    C) 87.3%
    D) 86.5%
    E) None of the above.

*Handwritten: $(.3)88 + (.3)(95) + (.4)(79) = 86.5\%$*

Use the following normal distribution to answer questions #14 - #16.

Consider the normal distribution of coral snake length:  **Mean length:  64 cm    Standard deviation length:  2 cm**

.15%    2.35%    13.5%    34%    34%    13.5%    2.35%    .15%

58    60    62    64    66    68    70
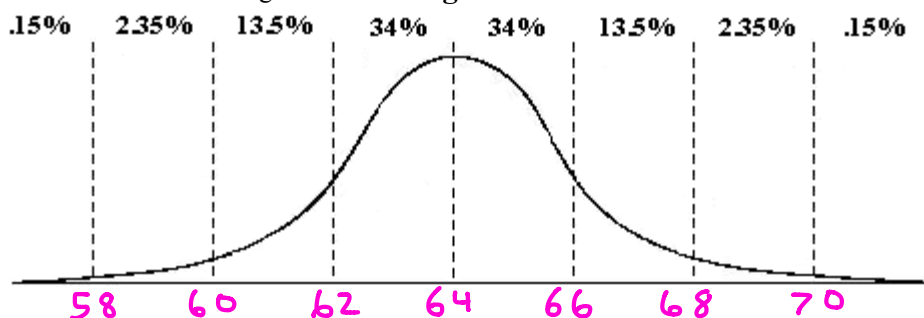
14) What percentage of coral snakes are between 58 cm and 66 cm in length?
   A) 83.85%
   B) 49.85%
   C) 15.85%
   D) 50%
   E) None of the above.

$$2.35 + 13.5 + 34 + 34 = 83.85\%$$

15) What percentage of coral snakes are longer than 66 cm?
   A) 83.85%
   B) 49.85%
   C) 15.85%
   D) 16%
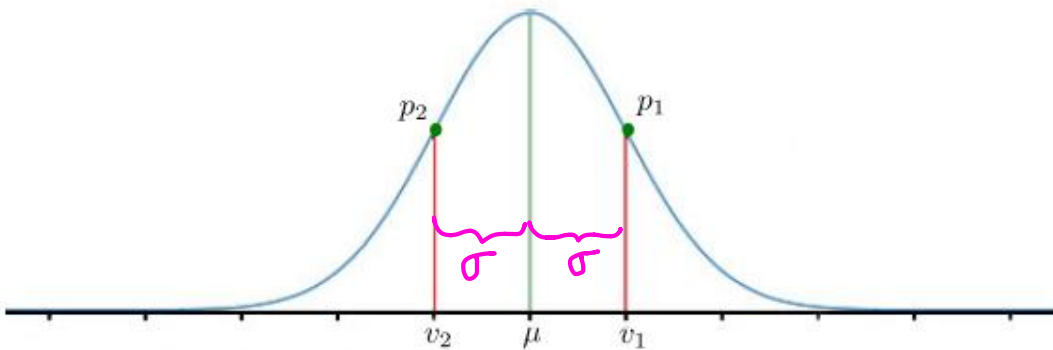   E) None of the above.

$$13.5 + 2.35 + 0.15 = 16\%$$

16) If you collect 250 coral snakes, how many snakes would be expected to be longer than 66 cm? Round to the nearest whole number.
   A) 210
   B) 125
   C) 40
   D) 33
   E) None of the above.

16% from previous question, so

$$(.16)(250) = 40$$

Use the following information for questions 17 to 20.



$P_1$ and $P_2$ are points of inflection of the normal distribution curve. Recall that points of inflection of the normal curve, occur at values, $v_1$ and $v_2$, exactly one standard deviation away from the mean, $\mu$.

17) Suppose that $\mu=10$ and $v_1 = 15$. What is the standard deviation?
   A) 3.5
   B) 7
   C) 5
   D) 15
   E) None of the above.

$v_1 - \mu = \sigma$ so $\sigma = 15 - 10 = 5$

18) Suppose that $\mu=10$ and $v_1 = 15$. What is $v_2$?
   A) 3.5
   B) 7
   C) 5
   D) 15
   E) None of the above.

$v_2 = \mu - \sigma = 10 - 5 = 5$

19) Suppose that $v_1 = 12$ and $v_2 = 17$. What is the median?
   A) 8
   B) 5
   C) 15
   D) 14.5
   E) None of the above.

$M = \frac{17 + 12}{2} = 14.5$   (the number in the middle of $v_1$ and $v_2$ is $\mu$)

20) Suppose that $\mu = 10.00$ and $\sigma = 25.00$. Find an approximation of the 3rd quartile $Q_3$.
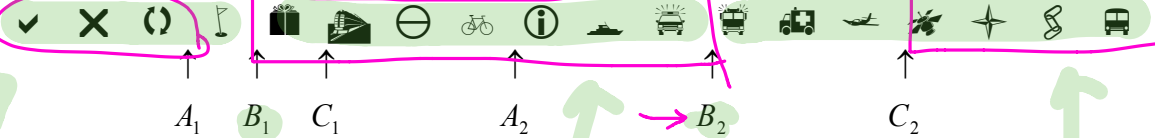   A) -6.875
   B) 26.875
   C) 10.00
   D) 5.00
   E) None of the above.

$Q_3 \approx \mu + (0.675)\sigma \approx 10 + (0.675)(25)$

$\approx 26.875$

A

B

C

$A_1$  $B_1$  $C_1$   $A_2$   $B_2$   $C_2$

21) Which of the following is NOT a fair share for player $B$?
   A) [icons]
   B) ✓ ✗ () [icons]
   C) [icons]
   D) [icons]
   E) None of the above.

*fair shares for B highlighted in green.*

22) What does player $C$ receive under the Method of Markers?
   A) ✓ ✗ () [icons]
   B) [icons]
   C) [icons]
   D) [icons]
   E) None of the above.

23) What are all the leftover items under the Method of Markers?
   A) [icons]
   B) [icons]
   C) ✓ ✗ () [icons]
   D) There are no items left over.
   E) None of the above.

Use the following to answer questions #8 - #10.
Aunt Bessy dies leaving her three nieces and nephews to divide up her painting, 1965 Mustang, and stamp collection. They decide to divide up the items using the method of sealed bids. Their bids on each of the items are as follows:

|          | Annie    | Billy    | Chad     |
|----------|----------|----------|----------|
| Painting | $35,000  | $42,000  | $37,000  |
| Mustang  | $12,000  | $12,000  | $18,000  |
| Stamps   | $10,000  | $9,000   | $8,000   |

24) What is Annie's fair share?
   A) $10,000
   B) $57,000
   C) $19,000
   D) $12,000
   E) None of the above.

Annie: $57,000 / $19,000 / $10,000 — $19,000 > 10,000 needs $9,000 Cash
Billy: $63,000 / $21,000 / $42,000 — $21,000 < $42,000 PAY $21,000
Chad: $63,000 / $21,000 / $18,000 — $21,000 < 18,000 needs $3,000 Cash

total of bids (bid total / # players) — fair share, Value of items won

25) Who gets the painting?
   A) Annie
   B) Billy
   C) Chad
   D) No one gets the painting.
   E) None of the above.

ESTATE: gets $21,000, pays out ($9,000 + $3,000)
Surplus = $21,000 − $12,000 = $9,000 → Split 3 ways ⇒ $3,000 each

26) After the final allocation, how much money will Chad receive?
   A) $18,000
   B) $21,000
   C) $63,000
   D) $6,000
   E) None of the above.

wants $21,000 (fair share)
gets $18,000 (Mustang)
gets $3,000 (Estate)
gets $3,000 MORE (surplus)

Total: Mustang + $6,000