Quantitative Skills & Reasoning - Math 1001

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Zoom Video 11-21-2019

Zoom Video Agenda

11/21/2019

1. Discuss Final Exam Schedule How to Prepare
2. Answer Any Questions
3. Cover Venn Diagrams & Logic Items
4. Work some key problems on practice final

How To Prepare for Final Exam

1. Work any homework or test questions you missed

   Take Practice Final on D2L – Password is egsc

   Make 90 – Add 3 points to final exam

   Make 80 – Add 2 points to final exam

   Make 70 – Add 1 point to final exam

2. Work Practice Final On My Web Site and Also Check out Video In Which I Worked It

http://faculty.ega.edu/facweb/bbrown/Quantitative%20Reasoning.htm

3. Contact me if you need help.

Question 1. Version 1*/1. Score: 1/1

Let A = {1, 2, 5, 8} and B = {1, 5, 6}. Indicate if each statement is true or false.

$10 \in A$ False ✓

$B \subset A$ False ✓

Question 2. Version 1*/1. Score: 1/1

Let S be the universal set, where:
$S = \{1, 2, 3, ..., 18, 19, 20\}$
Let sets A and B be subsets of S, where:

Set $A = \{4, 6, 8, 11, 13, 14, 17\}$

Set $B = \{1, 2, 6, 7, 9, 10, 11, 12, 15, 16, 17, 18, 20\}$

Find the following:

LIST the elements in the set $(A \cup B)$:
$(A \cup B)$ = { 1,2,4,6,7,8,9,10,11,12,13,14,15,16,17,18,20 } ✓

Enter the elements as a list, separated by commas. If the result is the empty set, enter DNE

LIST the elements in the set $(A \cap B)$:
$(A \cap B)$ = { 6,11,17 } ✓

Enter the elements as a list, separated by commas. If the result is the empty set, enter DNE

You may want to draw a Venn Diagram to help answer this question.

Question 3. Version 1*/1. Score: 1/1

Let the Universal set be the letters a through j: U = {a, b, ..., i, j}.

Let A = {c, g, h, j}, B = {c, d, f, g}, and C = {f, g, h, i}

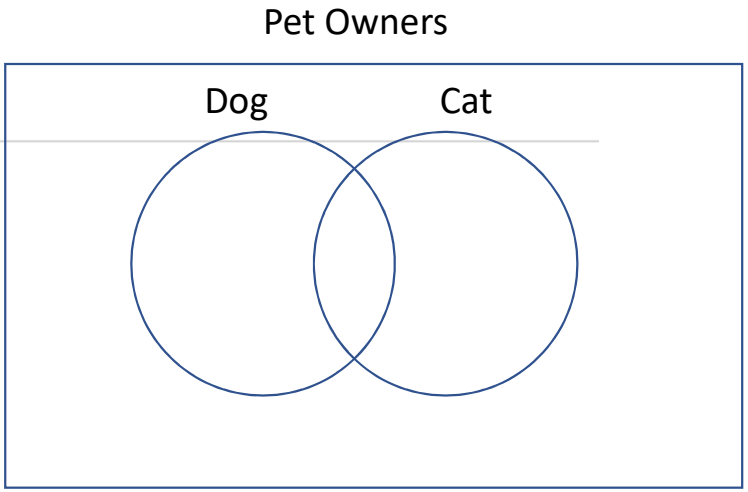
List the elements of the set $(A \cap B) \cup C$

c,g,f,h,i ✓

Question 4. Version 1*/1. Score: 1/1

In a survey of 87 pet owners, 48 said they own a dog, and 11 said they own a cat. 3 said they own both a dog and a cat. How many owned neither a cat nor a dog?

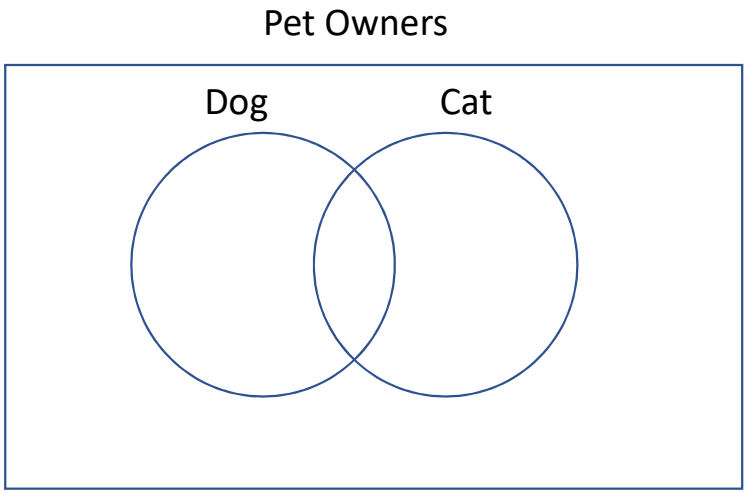
Answer = 31 owners



Question 5. Version 1*/1. Score: 1/1

In a survey of 152 pet owners, 70 said they own a dog, and 58 said they own a cat. 11 said they own both a dog and a cat? How many owned a dog but not a cat?

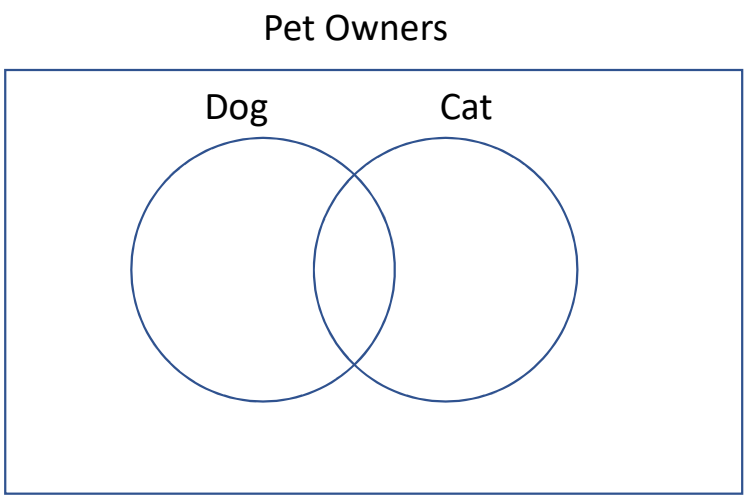
Answer = 59 ✓ owners



Question 6. Version 1*/1. Score: 1/1

In a survey of 96 pet owners, 17 said they own a dog, and 70 said they own a cat. 12 said they own both a dog and a cat. How many owned a cat but not a dog?

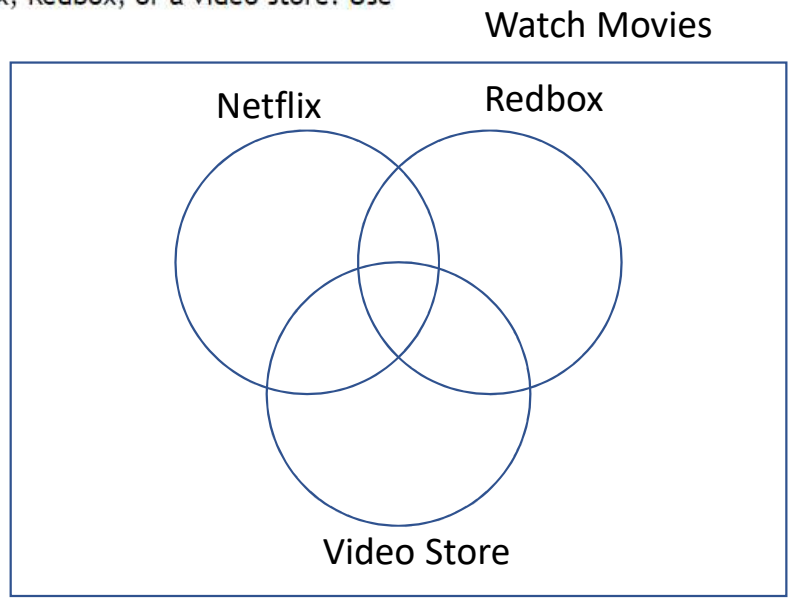
Answer = 58 ✓ owners

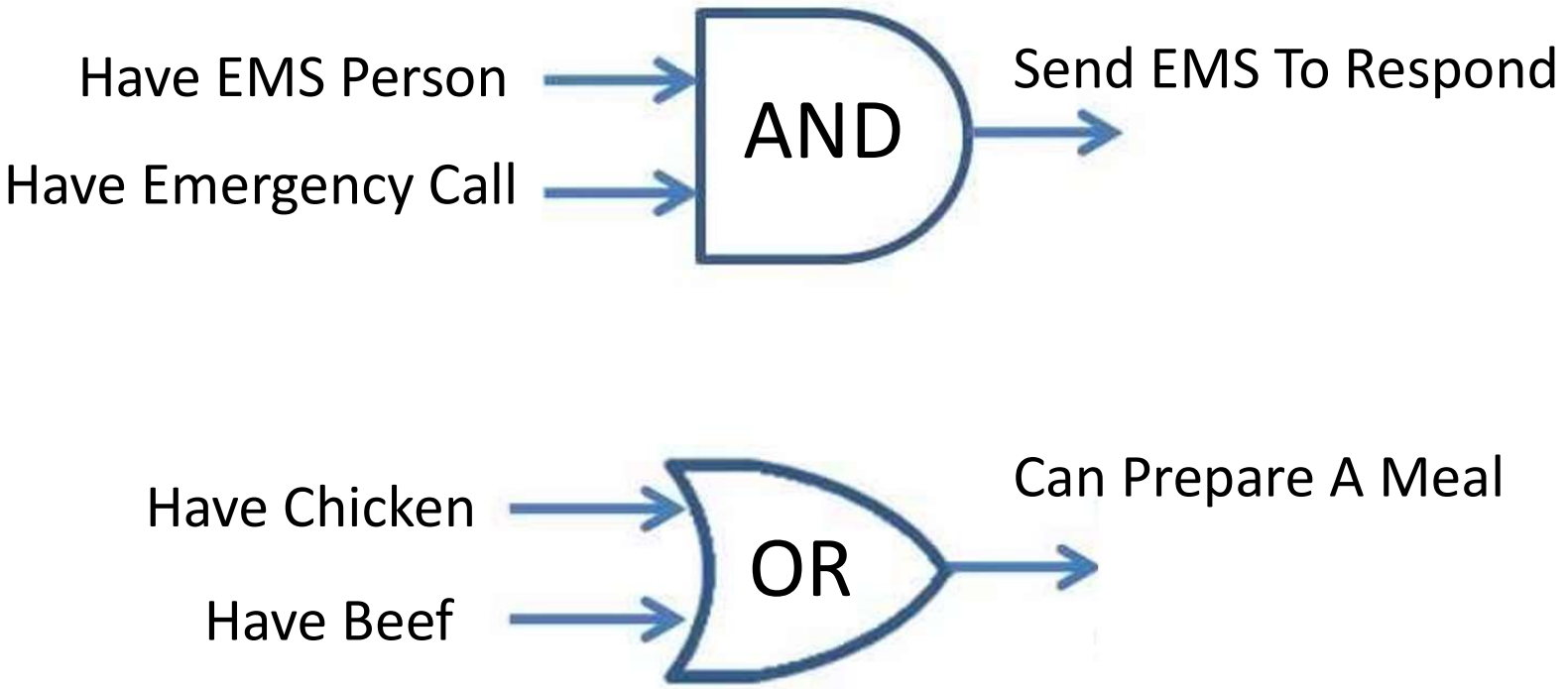


Question 7. Version 1*/1. Score: 1/1

A survey was given asking whether they watch movies at home from Netflix, Redbox, or a video store. Use the results to determine how many people use Redbox.

58 only use Netflix	44 only use Redbox
22 only use a video store	9 use only a video store and Redbox
59 use only Netflix and Redbox	25 use only a video store and Netflix
15 use all three	22 use none of these




Have EMS Person
Have Emergency Call
AND
Send EMS To Respond
Have Chicken
Have Beef
OR
Can Prepare A Meal

Conditional

A conditional is a logical compound statement in which a statement p, called the **antecedent**, implies a statement q, called the **consequent**.

A conditional is written as **p → q** and is translated as **"if p, then q".**

Consequent - a thing that follows another. (I say the consequence)

A **conditional** asserts that if its **antecedent (p) is true**, its **consequent (q)** is also **true**; **any conditional** with a **true antecedent** and a **false consequent** must be **false.**

The English statement “If it is raining, then there are clouds is the sky” is a conditional statement. It makes sense because if the antecedent (p) “it is raining” is true, then the consequent (q) “there are clouds in the sky” must also be true. **p → q**

Notice that the statement tells us nothing of what to expect if it is not raining; there might be clouds in the sky, or there might not. **If the antecedent is false, then the consquent becomes irrelevant.**

In traditional logic, a conditional is considered true as long as there are no cases in which the antecedent is true and the consequent is false. **If q is false then the conditional is obviously false.**

Truth table for the conditional

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

If it is raining then there will are clouds in the sky

We are evaluating if p → q is true or false

It is raining and there are clouds in the sky -True

It is raining and there are no clouds in the sky –False p → q is false

It is not raining and there are clouds in the sky –True - no evidence to contradict

It is not raining and no clouds in the sky –True - no evidence to contradict

Again, if the antecedent p is false, we cannot prove that the statement is a lie, so the result of the third and fourth rows is true.

“You are innocent until proved guilty.”

For any conditional, there are three related statements, the **converse**, the **inverse**, and the **contrapositive**.

Related Statements

The original conditional is "if p, then q" $p \rightarrow q$ true

The converse is "if q, then p" $q \rightarrow p$ may/may not be true

If there are clouds in the sky, it is raining

The inverse is "if not p, then not q" $\sim p \rightarrow \sim q$ may/may not be true

If it is not raining, there are no clouds in the sky

The contrapositive is "if not q, then not p" $\sim q \rightarrow \sim p$ always true

If there are no clouds in the sky, it is not raining

Consider again the conditional “If it is raining, then there are clouds in the sky.” It seems reasonable to assume that this is true. $p \rightarrow q$

The converse would be “If there are clouds in the sky, then it is raining.” This is not always true. $q \rightarrow p$

The inverse would be “If it is not raining, then there are not clouds in the sky.” Likewise, this is not always true. $\sim p \rightarrow \sim q$

The contrapositive would be “If there are not clouds in the sky, then it is not raining.” This statement is true, and is equivalent to the original conditional. $\sim q \rightarrow \sim p$

Biconditional

A biconditional is a logical conditional statement in which the antecedent and consequent are interchangeable. **(This is not always the case for p&q)**

A biconditional is written as p ↔ q and is translated as “p if and only if q”.

Truth table for the biconditional

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

A biconditional is considered true as long as the antecedent and the consequent have the same truth value; that is, they are either both true or both false.

Example of A Biconditional Statement ~p → ~q

I have a triangle (p) if and only if my polygon has only three sides (q). (true)

My polygon has only three sides (q) if and only if I have a triangle (p). (true)

Also True

I don't have a triangle (~ p) if and only if my polygon does not have only three sides (~ q). (true)

My polygon does not have only three sides (~ q) if and only if I don't have a triangle (~ p). (true)

Question 1. Version 3*/3. Score: 1/1

Complete the truth table for the statements.

p	q	$p \vee q$	$p \wedge q$	$p \rightarrow q$	$p \leftrightarrow q$
T	T	T ✓	T ✓	T ✓	T ✓
T	F	T ✓	F ✓	F ✓	F ✓
F	T	T ✓	F ✓	T ✓	F ✓
F	F	F ✓	F ✓	T ✓	T ✓

Question 2. Version 3*/3. Score: 1/1

For the statement $Q \rightarrow P$, identify the Inverse, Converse, Contrapositive and original statement.

Converse: $P \rightarrow Q$

Inverse: $\sim Q \rightarrow \sim P$

Contrapositive: $\sim P \rightarrow \sim Q$

Statement: $Q \rightarrow P$

Question 3. Version 1*/1. Score: 1/1

Complete the truth table for the following compound statement.

$$\sim q \leftrightarrow \sim p$$

p	q	$\sim p$	$\sim q$	$\sim q \leftrightarrow \sim p$
T	T	F ✓	F ✓	T ✓
T	F	F ✓	T ✓	F ✓
F	T	T ✓	F ✓	F ✓
F	F	T ✓	T ✓	T ✓

$\sim q$	$\sim p$	$\sim q \leftrightarrow \sim p$
F ✓	F ✓	T ✓
T ✓	F ✓	F ✓
F ✓	T ✓	F ✓
T ✓	T ✓	T ✓

Complete the truth table for the following compound statement.

$$q \leftrightarrow \sim p$$

p	q	$\sim p$	$q \leftrightarrow \sim p$
T	T	F ✓	F ✓
T	F	F ✓	T ✓
F	T	T ✓	T ✓
F	F	T ✓	F ✓

Fill in the blanks in the following truth table.

p	q	$p \vee q$	$\sim q \rightarrow (p \vee q)$
T	T	T ✓	T ✓
T	F	T ✓	T ✓
F	T	T ✓	T ✓
F	F	F ✓	F ✓

$\sim q$	$p \vee q$	$\sim q \rightarrow (p \vee q)$
F	T ✓	T ✓
T	T ✓	T ✓
F	T ✓	T ✓
T	F ✓	F ✓

Determine whether the statement is true or false.

5) If horses have six legs, then Benjamin Franklin was the first president of the United States.

A) True B) False

Find the indicated probability. Round your answer to 6 decimal places when necessary.

9) You are dealt two cards successively (without replacement) from a shuffled deck of 52 playing cards. Find the probability that the first card is a king and the second card is a queen.

A) $\frac{13}{102}$ B) $\frac{2}{13}$ C) $\frac{1}{663}$ D) $\frac{4}{663}$

10) Of the 81 people who answered "yes" to a question, 11 were male. Of the 84 people who answered "no" to the question, 13 were male. If one person is selected at random from the group, what is the probability that the person answered "yes" or was male?

A) 0.636 B) 0.145 C) 0.57 D) 0.136

Evaluate the factorial expression.

11) $\frac{6!}{4!\ 2!}$

A) 1 B) 120 C) 6 D) 15

Solve the problem.

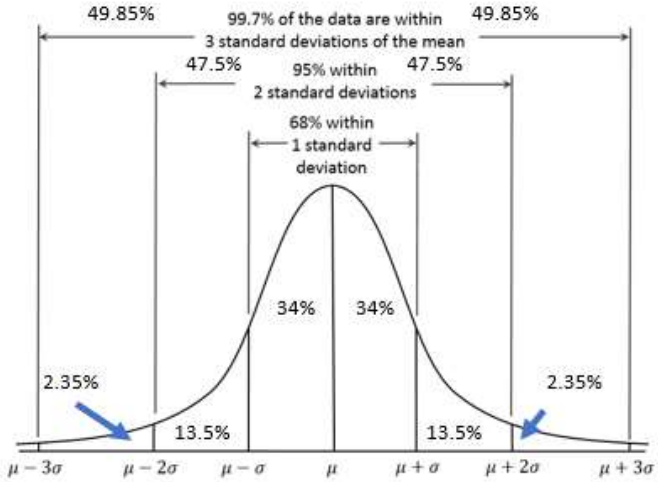
12) In a certain lottery, 6 different numbers between 1 and 12 inclusive are drawn. These are the winning numbers. How many different selections are possible? Assume that the order in which the numbers are drawn is unimportant.

A) 924 B) 720 C) 2,985,984 D) 665,280

Use the 68–95–99.7 rule to solve the problem.

13) Scores on a test are normally distributed with a mean of 105 and a standard deviation of 18. What percentage of scores are greater than 141?

A) 97.5% B) 5% C) 2.5% D) 95%



Solve the problem.

15) For the study described below, identify the population.

A manufacturer of light bulbs wants to determine the average lifetime of its 75-watt light bulbs. Among 120 randomly selected 75-watt light bulbs, the average lifetime was 1007 hours.

A) All 75-watt light bulbs manufactured by the company
B) All 75-watt light bulbs
C) The average lifetime of all 75-watt light bulbs manufactured by the company
D) The 120 randomly selected 75-watt light bulbs

Find the range for the given data.

17) The amount that Jeremy has saved in each of the last six months is shown below.

$117 $530 $167 $612 $414 $299

A) $530 B) $495 C) $117 D) $132

Solve.

22) Calculate the monthly payment for a home mortgage of $88,000 with a fixed APR of 3.7% for 15 years.

A) $637.78 B) $271.73 C) $6012.42 D) $767.84

$$PMT = \frac{PV\left(\frac{r}{n}\right)}{\left(1-\left(1+\frac{r}{n}\right)^{-n*t}\right)}$$

Write an equation for the linear function and use it to answer the given question.

23) You can purchase a motorcycle for $9090 or lease it for a down payment of $610 and $237 per month. Find an equation that describes how the cost of the lease depends on time. How long can you lease the motorcycle before you've paid more than its purchase price.

A) L = 610 + 237m; 40 months B) L = 610 − 237m; 35 months

C) L = 610 + 237m; 35 months D) L = 610 − 237m; 40 months

Evaluate the validity of the chain of conditionals.

25) Premise: If I pay my bills on time, then my credit will be good.
Premise: If my credit is good, then I will become a movie star.
Conclusion: If I pay my bills on time, then I will become a movie star.

A) Invalid B) Valid

Find the indicated probability. Round your answer to 6 decimal places when necessary.

34) Among the contestants in a competition are 41 women and 27 men. If 5 winners are randomly selected, what is the probability that they are all men?

A) 0.00774 B) 0.07968 C) 0.12385 D) 0.10773