

1) (3 points) Determine if the following argument is inductive or deductive reasoning and explain why:

Every time that it storms the electricity goes off. → known rule/generalization
specific ← Today, it is storming. Therefore, the electricity will go off.

Deductive! Based on a generalization and applied to a specific case

2) (4 points each) Determine the next most probable number or statement in the list:

a) 2, 8, 14, 20, _____

$\underbrace{\quad}$
 $\underbrace{\quad}$
 26

b) 2, -6, 18, -54, _____

$\underbrace{\quad}$
 $\times(-3)$ → 162

c) -3, -1, 8, 24, 47, _____

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 $\begin{array}{ccccccc} & \swarrow & & \swarrow & & \swarrow & \\ & 2 & 9 & 16 & 23 & 31 & \\ & \swarrow & & \swarrow & & \swarrow & \\ & 7 & 7 & 7 & 7 & & \end{array}$

d) $1+3+5=3^2$

$1+3+5+7=4^2$

$1+3+5+7+9=5^2$

$1+3+5+7+9+11=6^2$

3) (4 points each) Find the following sums:

a) $1+3+5+7+\dots+97$

$2n-1=97 \Rightarrow n=49$
 $1+3+5+\dots+97 = 49^2 = 2401$

b) $1+2+3+4+\dots+101 = \frac{101(101+1)}{2} = 5151$

b) $71+72+73+74+\dots+101$

Take out $1+2+3+\dots+70$ from part b: $\frac{70(70+1)}{2} = 2485$

$5151 - 2485 = 2666$

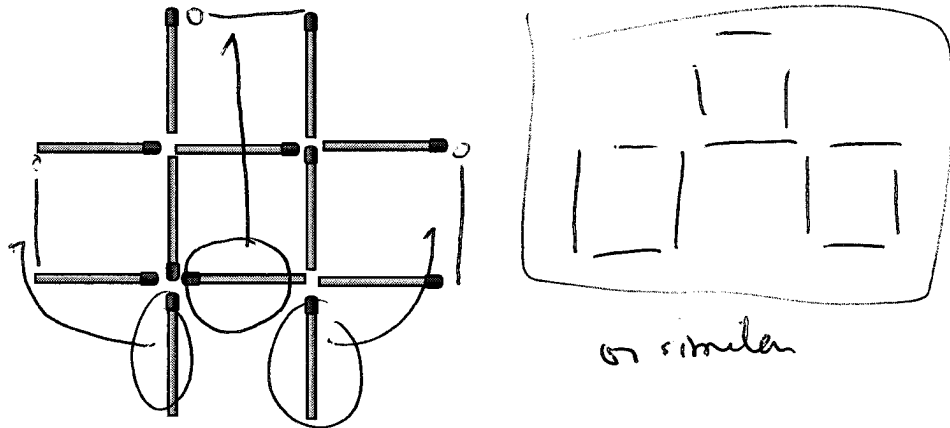
4) (3 points) Find the values of $a, b, c,$ and d . Be sure to label your answers:

$$\begin{array}{r} \\ \\ \\ \\ \hline \end{array}$$

$a=7$
 $b=8$
 $c=9$
 $d=1$

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- 5) (3 points) For the following matchstick problem, describe how to move 3 of the matchsticks to make 3 equal-sized squares without having any unused matchsticks. You may use letters to label the matchsticks and arrows to supplement your response.



- 6) (3 points) Write in set-builder notation: {Ohio, Florida, Washington, Maine...}

$$\{x \mid x \text{ is a US state}\}$$

- 7) (3 points) Write in roster-notation: {x | x is a color}

$$\{\text{red, blue, green, yellow, ...}\}$$

important

Problems 8 – 10 use the following:

Let $U = \{5, 6, 7, 8, 9, 10, 11, 12\}$ and let $A = \{x \mid x \text{ is prime}\}$ and $B = \{x \mid x \text{ has two digits}\}$

- 8) (3 points each) Use \in or \notin below:

a) $12 \in B$

b) $11 \in A \cap B$

c) $3 \notin A$

- 9) (3 points each) Use \subseteq or $\not\subseteq$ below:

a) $\{7, 9\} \subseteq A$

b) $\{5, 7\} \subseteq B'$

- 10) (4 points each) Find the following sets...

a) $A \cup B$

$$\{5, 7, 10, 11, 12\}$$

b) $(A \cup B)'$

$$\{6, 8, 9\}$$

c) $A - B$

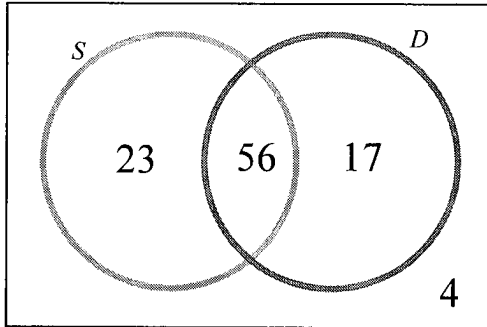
$$\{5, 7\}$$

d) Subsets of B

$$\begin{array}{l} \{10, 11, 12\} \quad \{10, 11\} \quad \{10\} \quad \emptyset \\ \{10, 12\} \quad \{11\} \\ \{11, 12\} \quad \{12\} \end{array}$$

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- 11) (5 points) 100 adults who watch British television were surveyed. The results are given in the Venn diagram below where S = Adults who watch *Sherlock* and D = Adults who watch *Downton Abbey*. Interpret, in English, what each number in the Venn diagram means for this example:



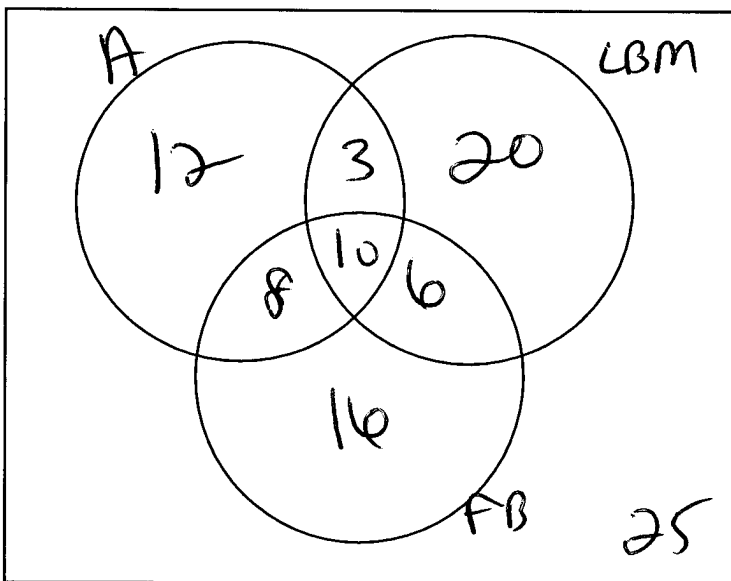
23 only watch *Sherlock*
 56 watch both
 17 only watch DA
 4 watch neither

- 12) (6 points part a; 4 points else) A recent survey was conducted where 100 people were asked which of the following movies they saw:

33 saw *Arrival*
 39 saw *The Lego Batman Movie*
 40 saw *Fantastic Beasts*
 13 saw *Arrival* and *The Lego Batman Movie*
 18 saw *Arrival* and *Fantastic Beasts*
 16 saw *The Lego Batman Movie* and *Fantastic Beasts*
 10 saw all three

Use the given this information to answer the following questions. **Be sure to write the numbers you are using for the sums:**

- a) Draw and label a Venn diagram:



- b) How many people saw *The Lego Batman Movie* or *Arrival* but not *Fantastic Beasts*?

$$12 + 3 + 20 = 35$$

- c) How many people do not see *Arrival*?

$$100 - 33 = 67$$

$$20 + 6 + 10 + 25 = 67$$

- d) How many people saw at least two movies?

$$3 + 8 + 6 + 10 = 27$$

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