**Practice Test**

1) a) Draw a Venn diagram to show these sets.

* The universal set U = {natural numbers from 1 to 30 inclusive}
* E = {multiples of 2}
* F = {multiples of 16}
* S = {multiples of 3}

b) List the disjoint sets, if there are any.

c) Is any set a subset of the other sets? Explain.

d) Define S’. How is it different from E’?

e) Give an example of an empty set.

2) There are 28 students on the school track and field team.

* 19 have black hair.
* 8 have blue eyes.
* 9 do not have black hair or blue eyes.

a) How many students have black hair and blue eyes? Explain.

b) How many students have black hair but not blue eyes?

c) How many students have blue eyes but not black hair?

3) Consider these two sets:

* A = {−12, −9, −6, −3, 0, 3, 6, 9, 12}
* B = {x ⏐−12 ≤ x ≤ 12, x ∈ I}

a) Determine A ∪ B, n(A ∪ B), A ∩ B, and n(A ∩ B).

b) Draw a Venn diagram to show these two sets.

4) Neil asked 40 people at a bookstore if they prefer romance novels or horror novels.

* 18 people do not like either type.
* 10 people like romance novels.
* 13 people like horror novels.

Determine how many people like both romance novels and horror novels.

5) Determine whether each statement is biconditional, and explain your reasoning. If the statement is biconditional, write it in biconditional form. If it is not biconditional, give a counterexample.

a) If x is positive, then 10x > x.

b) If you live in Victoria, then you live on Vancouver Island.

c) If xy is an odd number, then both x and y are odd numbers.

d) If two numbers are even, then their sum is even.

6) For each conditional statement below, verify or disprove the statement, its converse, its inverse, and its contrapositive with a counterexample.

a) If a number is positive, then it is not negative.

b) If Monday is a holiday, then it is a long weekend.

7) A survey of students in a school cafeteria had these results:

* 50% of the students drink bottled water.
* 56% eat fruit.
* 43% follow a low-fat diet.
* 22% drink bottled water and follow a low-fat diet.
* 23% follow a low-fat diet and eat fruit.
* 27% drink bottled water and eat fruit.
* 15% drink bottled water, follow a low-fat diet, and eat fruit.

What percent of the students do not drink bottled water, do not follow a low-fat diet, and do not eat fruit?

**Answer key**

1) a) b) *F* and *S* C) *F* $⊂$ *E*

 d) S’ = {natural numbers from 1 to 30 not divisible by 3}; It is different from E’, which is the set of natural numbers that are not multiples of 2.

 e) e.g., *H* = {multiples of 50}

2) a) 8; e.g., Of the 19 students with black hair, 8 have blue eyes.

 b) 11 c) 0

3) a) $A⋃B$ = {-12,-11,-10,-9,-8,-7,-6,-5,-4,-3,-2,-1,0,1,2,3,4,5,6,7,8,9,10,11,12}; n($A⋃B$) = 25; A$⋂B$ = {-12,-9,-6,-3,0,3,6,9,12}; n ($A⋂B$)=9

 b)

4) 1

5) a) biconditional; x is positive if and only if 10x > x.

 b) not biconditional: e.g., You might live in Port Hardy.

 c) biconditional; xy is an odd number if and only if both x and y are odd numbers.

 d) not biconditional; Two odd numbers have an even sum.

6) a) conditional statement: true b) conditional statement: true

 converse: false converse: false

 inverse: false inverse: false

 contrapositive: true contrapositive: true

7) 8%