

1-

a-

Converse: if I will stay at home then it snows tonight

Contrapositive: if I won't stay at home then it doesn't snow tonight.

Inverse: if it doesn't snow tonight then I won't stay at home

b-

Converse: it is a sunny summer day whenever I go to the beach.

Contrapositive: it isn't a sunny summer day whenever I don't go to the beach.

Inverse: I don't go to the beach whenever it isn't a sunny summer day.

c-

Converse: if I sleep until noon then I stay up late.

Contrapositive: if I don't sleep until noon then I don't stay up late.

Inverse: if I don't stay up late then I don't sleep until noon.

2-

a → $P \oplus q'$

P	q	q'	$P \oplus q'$
1	1	0	1
1	0	1	0
0	1	0	0
0	0	1	1

b → $(P \rightarrow q) \oplus (P' \rightarrow r')$

P	q	r	P'	r'	$P \rightarrow q$	$P' \rightarrow r'$	$P \rightarrow q \oplus P' \rightarrow r'$
1	1	1	0	0	1	1	0
1	1	0	0	1	1	0	1
1	0	1	0	0	0	1	1
1	0	0	0	1	0	0	0
0	1	1	1	0	0	0	0
0	1	0	1	1	0	0	0
0	0	1	1	0	1	1	0
0	0	0	1	1	1	1	0

c → $(P \oplus q) \Rightarrow P \oplus q'$

P	q	q'	$P \oplus q$	$P \oplus q'$	$P \oplus q \Rightarrow P \oplus q'$
1	1	0	0	1	1
1	0	1	1	0	0
0	1	0	1	0	0
0	0	1	0	1	1

3-

$$a \rightarrow \exists x (P(x) \wedge Q(x))$$

$$b \rightarrow \exists x (P(x) \wedge Q(x))$$

$$c \rightarrow \forall x (P(x) \oplus Q(x))$$

$$d \rightarrow \forall x (P(x) \vee Q(x))$$

$$e \rightarrow \exists x \rightarrow (P(x) \wedge Q(x) \equiv H(x))$$

$$f \rightarrow H(x) \geq 2$$

g \rightarrow No student at the university know Python and ~~He~~/she
can speak english

4-

$$1 \rightarrow n=0 \quad 3 = \frac{3(s-1)}{4} = 3 \quad \checkmark$$

$$2 \rightarrow n=k \quad 3 + 3 \cdot s^1 + 3 \cdot s^2 + \dots + 3 \cdot s^k = \frac{3(s^{k+1}-1)}{4}$$

$$3 \rightarrow n=(k+1) \quad 3 + 3 \cdot s^1 + \dots + 3 \cdot s^k + 3 \cdot s^{k+1} = \frac{3(s^{k+2}-1)}{4}$$

$$\Rightarrow \frac{3 \cdot s^{k+2} - 3 - 12 \cdot s^{k+1}}{4} = \frac{3 \cdot s^{k+1} \cdot \frac{1}{s-1} - 3}{4} = \frac{3(s^{k+1}-1)}{4} \quad \checkmark$$

S-

$$1 - n = 1 \rightarrow \frac{1-1}{8} = 0 \quad \checkmark$$

$$2 - n = \frac{k}{\text{odd}} \rightarrow \frac{k^2-1}{8} = a \quad \underline{k^2-1 = 8a}$$

$$3 - n = k+2 \quad \frac{(k+2)^2-1}{8} = b$$

$$\Rightarrow k^2 + 4k + 3 = \frac{k^2-1}{8} + k(k+1)$$

$\frac{8a}{8} = a$

\checkmark

$$\Rightarrow \frac{4(k+1)}{8} \quad \underline{k = \text{odd}} \Rightarrow \underline{k+1 = \text{even}}$$

$$\frac{n+1}{2} = p \quad n+1 \text{ even} \quad \text{so it can be dividable with } 2$$

\checkmark

So it's correct



6-


$$(a) \rightarrow x^2 - 6x + 8 = (x-4) \cdot (x-2) \Rightarrow \underline{x=4, x=2}$$
$$+ = \{4, 2\}$$

$$(b) \rightarrow y = [2, 3]$$

$$(c) \rightarrow \{4, 2, 5, 4\}$$

$$(d) \rightarrow \{4, 8, 7, 2\} - \{8, 7\} \Rightarrow \{4, 2\}$$

(e)   4 side and 23 2 digit

 $\{4, 2\}$

Bonus - :

a-) if the flowers are not blooming or it is sunny
result is true else result is false.

b-)

```
boolean func1{
```

```
    boolean boolFlower, Sun;
```

```
    Scanner scanner = new Scanner(System.in);
```

```
    boolFlower = scanner.nextBoolean();
```

```
    Sun = scanner.nextBoolean();
```

```
    if (!boolFlower || Sunny) return true;
```

```
    return false;
```

```
}
```