ST-1 CO205

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1. $(p * q) \equiv \neg(p \vee q)$

correct option ⇒ (c) Contingency

2. $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$n(B) = 20 - 12 + 4 = 12$

correct option ⇒ (a) 12.

3. $(p \wedge q) \rightarrow q$. (Tautology)

$q \rightarrow (p \vee q)$ (Tautology)

correct opt ⇒ (a), (b).

4. " 2 is odd and -3 is not negative ".

correct option ⇒ (d).

5. if $p \rightarrow q$ is false, then p = true, q = false.

$\therefore (\neg(p \wedge q)) \rightarrow q \Rightarrow$ false.

correct option ⇒ (b) False.

6. correct option ⇒ (a) if the insurance company pays me, then the flood destroys my house or the fire destroys the house.

7. $\sim(P \vee F) \equiv P$

$\sim(P \wedge F) \equiv F$

correct option $\Rightarrow$ (b), (d).

8. $2^m - 2^n = 56$, $8 \times 7 = 56$

$2^n(2^{m-n} - 1) = 5$

$\underset{\substack{\uparrow \\ \text{even} \\ (8)}}{2^n}\,(\underset{\substack{\uparrow \\ \text{odd} \\ (7)}}{2^{m-n} - 1})$

$2^n = 8$, $2^{m-n} = 7$

$n = 3$, $m - 3 = 3$

$m = 6$.

$\boxed{m = 6 \,,\, n = 3}$

9. ~~$\forall x \, \neg P(x) \equiv \neg (\exists x \, \neg P(x))$~~

i) $\forall x \left(P(x) \wedge Q(x) \right) \equiv \forall x \, P(x) \wedge \forall x \, Q(x)$

ii) $\exists x \left(P(x) \vee Q(x) \right) \equiv \exists x \, P(x) \vee \exists x \, Q(x)$

iii) $\exists x \left(P(x) \wedge (\forall y)\right) \left(Q(y) \rightarrow R(x, y) \right)$.

10. i) concluded that $P(c)$ is true, where c is a particular member of domain, given the premise $\forall x \, P(x)$.

ii) $\forall x \, P(x)$ is true, given that premise $P(c)$ is true for all elements c in that domain.

$\forall x (P(x) \rightarrow Q(x))$ is true if $P(a)$ is true for a particular element in the domain of universal quantifier, then $Q(a)$ must also be true.