317HW1

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1. $\neg\big((p \wedge q) \wedge r\big) = \big(\neg(p \wedge q)\big) \vee (\neg r) = (\neg p) \vee (\neg q) \vee (\neg r)$

   Amazon is not straight or Andromeda has black holes or sensors don't need low duty-cycle.

2. Assuming $(((p \wedge \neg q) \vee r) \wedge \neg \mathrm{s} = m,\ ((\neg p \vee \neg q \vee \mathrm{s}) \wedge (r \vee \neg s) = n$
   So now we have $m \Rightarrow n$
   Truth Table:

p	q	r	s	m	n	$m \Rightarrow n$
T	T	T	T	F	T	T
T	T	T	F	T	F	F
T	T	F	T	F	F	T
T	T	F	F	F	F	T
T	F	T	T	F	T	T
T	F	T	F	T	T	T
T	F	F	T	F	T	T
T	F	F	F	T	T	T
F	T	T	T	F	T	T
F	T	T	F	T	T	T
F	T	F	T	F	F	T
F	T	F	F	F	T	F
F	F	T	T	F	T	T
F	F	T	F	T	T	T
F	F	F	T	F	F	T
F	F	F	F	F	T	T

3.

i.

p	q	$(p \Rightarrow \mathrm{q}) \wedge \mathrm{p}$	q
T	T	T	T
T	F	F	F
F	T	F	T
F	F	F	F

It can be proved that $((\mathrm{p} \Rightarrow \mathrm{q}) \wedge \mathrm{p}) \Rightarrow \mathrm{q}$ is valid.

ii.

a. $((p \Rightarrow q) \wedge (q \Rightarrow r)) \Rightarrow (p \Rightarrow r)$

p	q	r	$(p \Rightarrow q) \wedge (q \Rightarrow r)$	$p \Rightarrow r$
T	T	T	T	T
T	T	F	F	F

T	F	T	F	T
T	F	F	F	F
F	T	T	T	T
F	T	F	F	T
F	F	T	T	T
F	F	F	T	T

The chain argument has been proved to be valid.

b. $((p \Rightarrow (q \Rightarrow r)) \Leftrightarrow ((p \wedge q) \Rightarrow r)$

p	q	r	$(p \Rightarrow (q \Rightarrow r)$	$(p \wedge q) \Rightarrow r$
T	T	T	T	T
T	T	F	F	F
T	F	T	T	T
T	F	F	T	T
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	T	T

The Exportation is valid.

4.

$63234_7 = 4 + 7 * 3 + 7 ^ 2 * 2 + 7 ^ 3 * 3 + 7 ^ 4 * 6 = 15558_{10}$

$58392_9 = 2 + 9 * 9 + 9 ^ 2 * 3 + 9 ^ 3 * 8 + 9 ^ 4 * 5 = 38963_{10}$

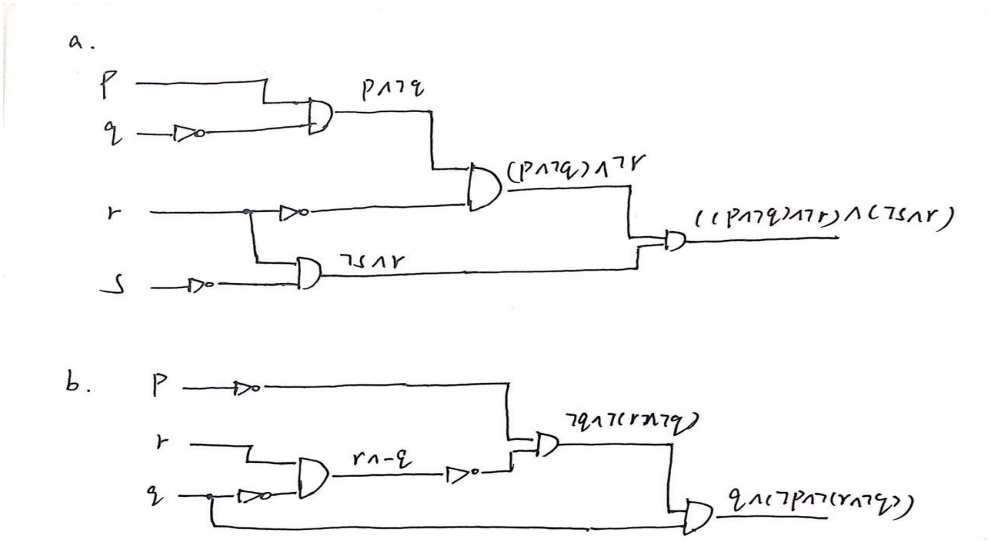
$10010111100101_2 = 1 + 2 ^ 2 + 2 ^ 5 + 2 ^ 6 + 2 ^ 7 + 2 ^ 8 + 2 ^ 10 + 2 ^ 13 = 9701_{10}$

$6341_{10} = 2 ^ 12 + 2 ^ 11 + 2 ^ 8 + 2 ^ 5 + 2 ^ 3 + 1 = 1100011000101_2$

$89983_{10} = 3 ^ 10 + 3 ^ 9 + 3 ^ 8 + 3 ^ 7 * 2 + 3 ^ 5 + 3 ^ 3 * 2 + 3 ^ 2 * 2 + 1 = 111201022013$

$4444_{10} = 4 ^ 6 + 4 ^ 4 + 4 ^ 3 + 4 ^ 2 + 4 * 3 = 1011130_4$

5.



6.

a. worst case:

Time for finding and transferring 2 pages from the hard disk to RAM consists of seek time, transfer time and rotational latency.

For two pages, worst rotational latency time is 8ms and the worst seek time is 40ms.

The transfer time for one page is $400/25 = 16s$

$$\mathrm{T} = 40\mathrm{ms} + 8\mathrm{ms} + 16\mathrm{s} = 16.048s$$

b. average case:

$$\mathrm{T} = \left(\frac{400}{25}\right) + 2 * (2 + 20)/2 = 16.024\mathrm{ms}$$