Tutorial 2

Q.1. Find $f(1)$, $f(2)$, $f(3)$ and $f(4)$ and if $f(n)$ is defined recursively by $f(0) = 1$ and $n = 0, 1, 2 - -$

(a) $f(n+1) = f(n) + 2$ $\quad n=0$

$f(1) = f(0) + 2$
$f(1) = 1 + 2 = 3$
$f(2) = f(1) + 2$
$f(2) = 3 + 2 = 5$
$f(3) = f(2) + 2$
$= 5 + 2 = 7$
$f(4) = f(3) + 2$
$= 7 + 2 = 9$

(b) $f(n+1) = 2^{f(n)}$
$f(1) = 2^1$
$= 2$
$f(2) = 2^{2}$
$= 4$
$f(3) = 2^4$
$= 16$
$f(4) = 2^{16}$

(c) $f(n+1) = 3f(n)$ $\quad f(4) = 81$
$f(0+1) = 3 \cancel{f(0)} 1$
$= 3$
$f(2) = 9$
$f(3) = 3 f(2) = \cancel{3 \times f} 27$

123
$\times 2$
246

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Q.2 use the Euclidean algorithm to find.

~~(a) gcd(100, 101)~~

(b)

$123 \overline{)\,277\,}$ 2
246
$31 \overline{)\,123\,}$ 3
93
$30 \overline{)\,31\,}$ 1
30
$\boxed{1} \overline{)\,30\,}$ 30
30
00

gcd

gcd = 1

(a) gcd 100, 101

$100 \overline{)\,101\,}$ 1
100
$1 \overline{)\,100\,}$ 100
100
000

gcd=1

(c) gcd /1529 . 14034

$$\begin{array}{r} 9 \\ 1529 \overline{) 14835} \\ 13761 \\ \hline 001278 \end{array}$$

$$\begin{array}{r} 5 \\ 278 \overline{) 1529} \\ 1390 \\ \hline 0139 \end{array}$$

$$\begin{array}{r} 2 \\ 139 \overline{) 278} \\ 278 \\ \hline 000 \end{array}$$

gcd

gcd = 139

Q.3 Find Prime factorization

a)

2	88
2	44
2	22
11	11
	1

$88 = 2^3 \times 11$

b) 126

2	126
3	63
3	21
7	7
	1

$126 = 2 \times 3^2 \times 7$

c) 729

3	729
3	243
3	81
3	27
3	9
3	3
	1

$729 = 3^6$

d) 1001

$$\begin{array}{r|l} 7 & 1001 \\ \hline 11 & 143 \\ 13 & 13 \\ & 1 \end{array}$$

$1001 = 7 \times 11 \times 13$

e) 1111

$$\begin{array}{r|l} 11 & 1111 \\ \hline 101 & 101 \\ & 1 \end{array}$$

$1111 = 11 \times 101$

F) 909090

$$\begin{array}{r|l} 2 & 909090 \\ \hline \cancel{5} & \cancel{454545} \\ \cancel{9} & \cancel{90909} \\ & 10101 \end{array}$$

$$\begin{array}{r|l} 2 & 909090 \\ \hline 3 & 454545 \\ 3 & 151515 \\ 3 & 50505 \\ 5 & 16835 \\ 7 & 3367 \\ 13 & 481 \\ 37 & 37 \\ & 1 \end{array}$$

$909090 = 2 \times 3^3 \times 5 \times 7 \times 13 \times 37$

Q. 4) a) $68 \div 17 = 4$ yes

b) $84 \div 17 =$ Not divided

c) $357 \div 17$

$$17 \overline{)\,357\,} \quad 21$$
357
000

yes, divided

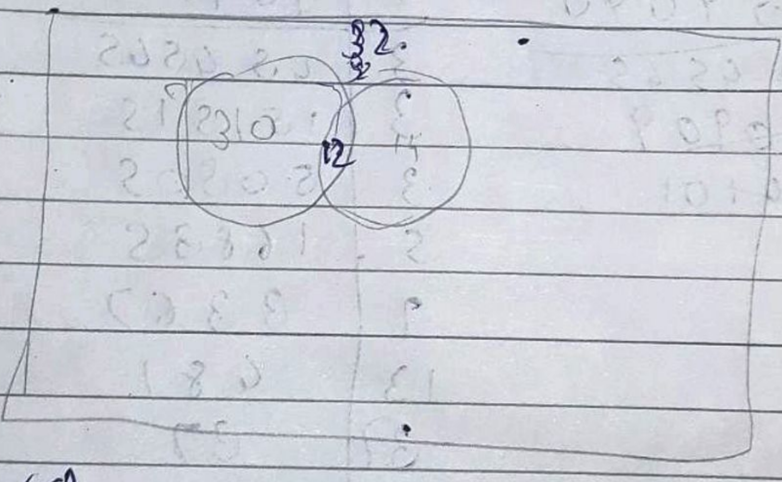
d) 1001

$$17 \overline{)\,1001\,} \quad 58$$
85
151
136
015

Not divisible.

Q 5) 22 → female
18 → male
40 → Total

Q. 6)



44
−32
12

(a) $N(P \cap B) = N(P) + N(B) - N(P \cup B)$
$= 30 + 14 - 32$
$= \underline{12}$

(b) $N(P) - N(P \cap B) = 30 - 12 = 18$

7) $n = 8$

$r = 3$

$\therefore {}^nP_r = P(n, r)$

$\therefore {}^8P_3 = P(8, 3)$

$= \frac{8!}{(8-3)!} = \frac{8!}{5!} = 8 \times 7 \times 6$

$= \cancel{336}\ 336$

or $8c_1 \times 7c_1 \times 6c_1 = 8 \times 7 \times 6 = 336$

(8) $52c_5 = \frac{(52!)}{(5!)(47!)} = \frac{52 \times 51 \times 50 \times 49 \times 48}{5!}$

$= \boxed{2598960}$

$\Rightarrow 52c_{5} = \boxed{2598960}$

(9) | A | B | C | D | E | F | G | H |

$= 6! = \boxed{720}$ ← string ABC

ABC, D, E, F, G, H
1 2 3 4 5 6

(10) $C(30, 6) = 30c_6$

$= \frac{30!}{6! \times 24!} = \frac{30 \times 29 \times 28 \times 27 \times 26 \times 25}{6!}$

$= \boxed{593775}$