FUNCTIONS - SOLUTIONS

F1. $f(x,y) = x + y^2$.

$f(\text{row}, \text{column})$	1	2	3	4	5	6	7
1	2	5	10	17	26	37	50
2	3	6	11	18	27	38	51
3	4	7	12	19	28	39	52
4	5	8	13	20	29	40	53
5	6	9	14	21	30	41	54
6	7	10	15	22	31	42	55
7	8	11	16	23	32	43	56

F2. $f(x,y) = \binom{\max(x,y)}{\min(x,y)}$.

$f(\text{row}, \text{column})$	1	2	3	4	5	6	7
1	1	2	3	4	5	6	7
2	2	1	3	6	10	15	21
3	3	3	1	4	10	20	35
4	4	6	4	1	5	15	35
5	5	10	10	5	1	6	21
6	6	15	20	15	6	1	7
7	7	21	35	35	21	7	1

F3. $f(x) = \omega(x)$, the number of distinct primes in the factorization of x.

x	$f(x)$	x	$f(x)$	x	$f(x)$	x	$f(x)$
1	0	26	2	51	2	76	2
2	1	27	1	52	2	77	2
3	1	28	2	53	1	78	3
4	1	29	1	54	2	79	1
5	1	30	3	55	2	80	2
6	2	31	1	56	2	81	1
7	1	32	1	57	2	82	2
8	1	33	2	58	2	83	1
9	1	34	2	59	1	84	3
10	2	35	2	60	3	85	2
11	1	36	2	61	1	86	2
12	2	37	1	62	2	87	1
13	1	38	2	63	2	88	2
14	2	39	2	64	1	89	1
15	2	40	2	65	2	90	3
16	1	41	1	66	3	91	2
17	1	42	3	67	1	92	2
18	2	43	1	68	2	93	2
19	1	44	2	69	2	94	2
20	2	45	2	70	3	95	2
21	2	46	2	71	1	96	2
22	2	47	1	72	2	97	1
23	1	48	2	73	1	98	2
24	2	49	1	74	2	99	2
25	1	50	2	75	2	100	2

F4. $f(x)$ = sum of digits of x in base 3 expressed as a base 10 number.

x	$f(x)$	x	$f(x)$	x	$f(x)$	x	$f(x)$
1	1	26	6	51	5	76	6
2	2	27	1	52	6	77	7
3	1	28	2	53	7	78	6
4	2	29	3	54	2	79	7
5	3	30	2	55	3	80	8
6	2	31	3	56	4	81	1
7	3	32	4	57	3	82	2
8	4	33	3	58	4	83	3
9	1	34	4	59	5	84	2
10	2	35	5	60	4	85	3
11	3	36	2	61	5	86	4
12	2	37	3	62	6	87	3
13	3	38	4	63	3	88	4
14	4	39	3	64	4	89	5
15	3	40	4	65	5	90	2
16	4	41	5	66	4	91	3
17	5	42	4	67	5	92	4
18	2	43	5	68	6	93	3
19	3	44	6	69	5	94	4
20	4	45	3	70	6	95	5
21	3	46	4	71	7	96	4
22	4	47	5	72	4	97	5
23	5	48	4	73	5	98	6
24	4	49	5	74	6	99	3
25	5	50	6	75	5	100	4

F5. $f(n) = v_3(n!)$, the highest power of 3 that divides $n!$.

n	$f(n)$	n	$f(n)$	n	$f(n)$	n	$f(n)$
1	0	26	10	51	23	76	35
2	0	27	13	52	23	77	35
3	1	28	13	53	23	78	36
4	1	29	13	54	26	79	36
5	1	30	14	55	26	80	36
6	2	31	14	56	26	81	40
7	2	32	14	57	27	82	40
8	2	33	15	58	27	83	40
9	4	34	15	59	27	84	41
10	4	35	15	60	28	85	41
11	4	36	17	61	28	86	41
12	5	37	17	62	28	87	42
13	5	38	17	63	30	88	42
14	5	39	18	64	30	89	42
15	6	40	18	65	30	90	44
16	6	41	18	66	31	91	44
17	6	42	19	67	31	92	44
18	8	43	19	68	31	93	45
19	8	44	19	69	32	94	45
20	8	45	21	70	32	95	45
21	9	46	21	71	32	96	46
22	9	47	21	72	34	97	46
23	9	48	22	73	34	98	46
24	10	49	22	74	34	99	48
25	10	50	22	75	35	100	48

Shuttle - Solutions

A1. 55

A2. 34

A3. 5

A4. 90

B1. 103

B2. 13

B3. 690

B4. 14

RELAY - SOLUTIONS

Team:

Referee:

R1   421   □   □   4   3   0

R2 $\dfrac{\sqrt{2}-\sqrt{6}}{4} = -\sin 15°$ □   □   4   3   0

R3 $\dfrac{2023}{2^{2022}}$ □   □   4   3   0

R4   0   □   □   4   3   0

R5 $\frac{1}{6!\cdot 337!}$ □   □   4   3   0

R6 $\binom{4046}{2023} - 2^{2022}$ □   □   4   3   0

Time   □   4   2   0

□ /28

Crossnumber - Solutions

9		6	6	8		6
5	6	8			3	9
3		1		1	6	
1	1	6	6	4		2
	9			4	2	0
	2	5	7			2
4	1		7	5	3	1