2. a) i) $134 \bmod 6 = 2$
$88 \bmod 6 = 4$
⇒ Not congruence

ii) $1573 \bmod 7 = 5$
$12850 \bmod 7 = 5$
$\Rightarrow 1573 \equiv 12850 \pmod 7$

b) ISBN-10: 0262046630X

$S_d = 143 \equiv 0 \pmod{11}$

Change 4 to 5. $S_d' = 148 \pmod{11} = 5$)
0262056630X

3 a) i)

m	n	r
247	117	13
117	13	0

⇒ gcd(247, 117) = 13

ii)

m	n	r
1479	272	119
272	119	34
119	34	17
34	17	0

gcd(1479, 272) = 17

b) i) ~~38887~~ gcd(3157, 656) = 41
2173 mod 41 = 0

i	q_i	r_i	x_i	y_i
-1		3157	1	0
0		656	0	1
1	4	533	1	-4
2	1	123	-1	5
3	4	41	5	-24
4	3	0	-16	77

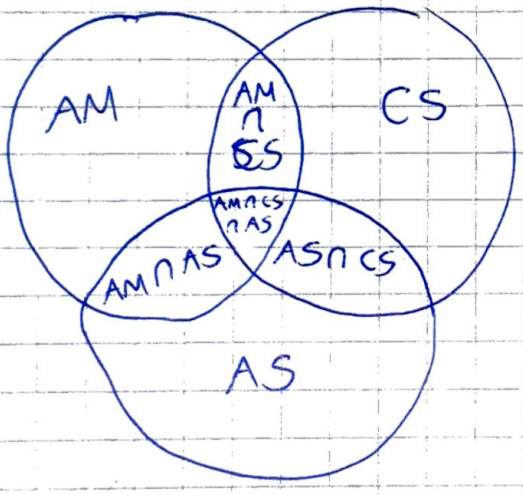
$2173/41 = 53$

$x = 265$
$y = -1272$

4. $AM = 120$
$CS = 200$
$AS = 60$
$CS \cap AS = 40$
$AM \cap CS = 80$
$AM \cap AS = 30$
$AM \cap CS \cap AS = 20$

a) $AM \cup CS \cup AS = 120 + 200 + 60 - 40 - 80 - 30 + 20$
$= 250$

b)



5b)
13 ranks in one deck
Choose 1st rank: 13 ways
Choose 2nd rank: 13 - 1 = 12 ways
Choose cards for 1st rank:
$4C3 = 4$ ways
Choose cards for 2nd rank
$4C2 = 6$ ways

Total = $13 \times 12 \times 4 \times 6$
= 3744 ways

5a)
~~1st round:~~
~~Each group has $3! = 6$ games.~~
~~8 groups => $8 \cdot 6 = 48$ games~~
~~2nd round:~~
~~2 teams from 8 groups => 16 teams~~
~~4 groups w/ 4 teams each~~
~~4 groups => $4 \cdot 6 = 24$ games~~

5a) 1st round: 8 groups, 4 teams each. Pick 2 from 4. $4C2 = 6$
Each team plays 2 games. $6 \times 2 = 12$ games
Total game from 1st round = $12 \times 8 = 96$ games
Similarly for 2nd rand = $12 \times 4 = 48$ games
1st playoffs, 8 teams 1-on-1 = 8 games
2nd playoffs, 4 teams 1-on-1 = 4 games
Final: 2 games

$96 + 48 + 8 + 4 + 2$
$= 158$ games

3b) ii)

i	q_i	r_i	x_i	y_i
-1		1054	1	0
0		-833	0	1
1	-1	221	1	1
2	-3	-170	3	4
3	-1	51	4	5
4	-3	17	15	19
5	-3	0	49	62

$2277 \bmod 17 = 0$

$\gcd(1054, -833) = 17$

$a = 2277/17$

$\Rightarrow x = 15 \cdot \frac{2277}{17}$

$y = 19 \cdot \frac{2277}{17}$

4b) $|AM| = 120 - 80 - (30 - 20) = 30$

$|CS| = 200 - 80 - (40 - 20) = 100$

$|AS| = 60 - 30 - (40 - 20) = 10$

$|AM \cap CS| = 80 - 20 = 60$

$|AM \cap AS| = 30 - 20 = 10$

$|AS \cap CS| = 40 - 20 = 20$

$AM \cap CS \cap AS = 20$

$All = 30 + 100 + 10 + 60 + 10 + 20 + 20 = 250$

6a) 7! letters, 3 As, 2 Rs, 2 Ls

$\frac{7!}{2! \cdot 2! \cdot 3!} \times 6 = 420$ combinations