Discrete Math 11/6 2019

1) $3 \cdot 10 \cdot 26 \cdot 26 \cdot 2 = 40560 >$ # students at LNU.

which digit — position digit

upper case — for lower case

shift of the two letters.

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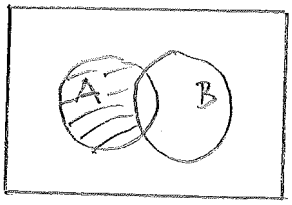
2) a) $\binom{17}{14}$

b) 

c) 

d) $(1+x)^5$

e) n must be odd. Then deg(x) is even for all $x \in V$.

f) $K_{n,n}$ $n \geq 2$.

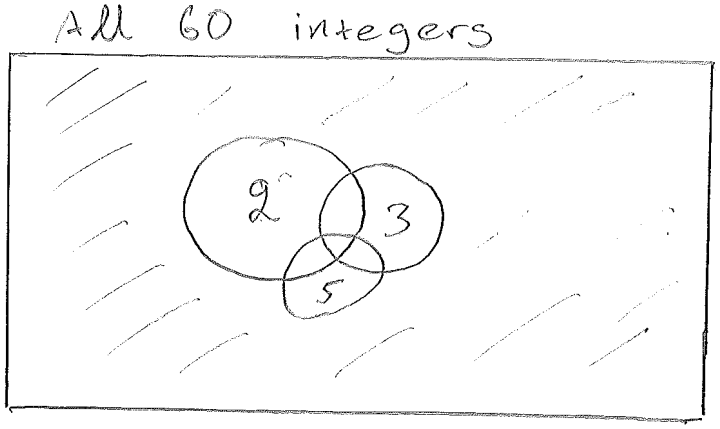
g) $5 \cdot 4 \cdot 3 = 60$

h) 2^7

i) 

j) $2^8 = 256$.

3)



(2) means multiples of 2 etcetera,

$$60 - (30+20+12) + (10+6+4) - 2$$

↑ even numbers; ↑ multiples of 6; ↑ 30 and 60

$$= 16$$ (14 primes and 1 and $7^2 = 49$).

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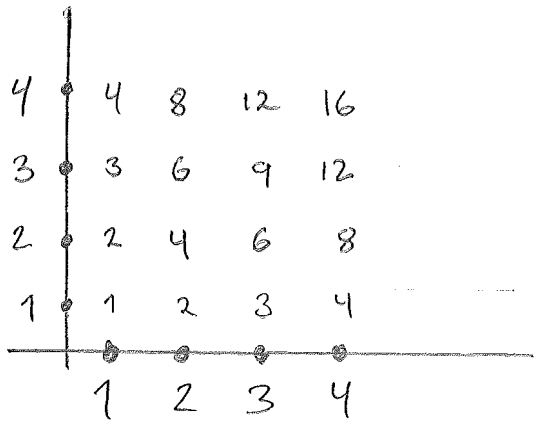
4)



The products are given in the grid.

Classes with only 1 element: $[(4,4)]$ and $[(1,1)]$ and $[(3,3)]$.

Classes with two elements:

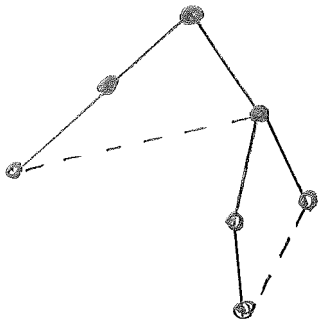
$[(1,2)]$, $[(1,3)]$, $[(2,3)]$, $[(2,4)]$, $[(3,4)]$.

One class with 3 members:

$[(2,2)] = \{(2,2), (1,4), (4,1)\}$.

$3 \cdot 1 + 5 \cdot 2 + 1 \cdot 3 = 16$ OK!

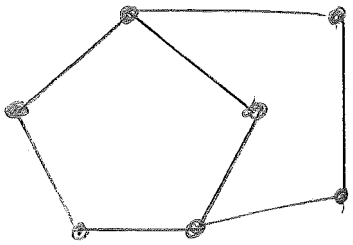
5) a) For trees $e = v-1$. Adding two edges creates two cycles.



b) $\frac{v+1}{2}$ (v odd)

$\frac{v}{2}$ (v even)

c) $\left\lfloor \frac{16}{3} \right\rfloor = 5$



Two cycles of length 5. One cycle of length 6.

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6) a) $2e = \sum_i \deg(R_i) \geq 3+3+3+\ldots+3 = 3r$. So $r \leq \frac{2e}{3}$.

$r = e - v + 2$ (Euler's formula)

so $e - v + 2 \leq \frac{2e}{3}$

$e \leq 3(v-2)$ for planar graphs.

6b) K_{11} has $\binom{11}{2} = 55$ edges.

If $v = 11$ G can be planar only if $e \leq 3(11-2) = 27$.

$55 - 27 = 28$.

So if G has 27 edges then $\bar{G}$ has 28 edges.

If G has e edges, $\bar{G}$ has $55 - e$ edges.

e or $55 - e$ is ≥ 28.