(a) What’s the gcd of 40 and 130?

(b) How many distinct factors does $12^{100}$ have?

Prime factorization is $2^{200}3^{100}$; so answer is $201 \times 101$

(c) 1009 is prime. What can you say about $437^{504} \mod 1009$?

By Fermat it’s square is 1; so it must be $\pm 1$

(d) Calculator says $4035 = 3 \times 5 \times 269$. What is the inverse of 15 in $\mathbb{Z}_{2017}$?

269 (Note that $4035 \mod 2017 = 1$.)