
M314 REVIEW EXERCISES 08.03.17

You're encouraged to discuss these problems with other students in the class.

1. Use the Sieve of Eratosthenes to find all prime numbers up to 136.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136

2. Find the prime power decomposition of the following numbers:

- 2040
- 551
- 1144
- 32805

3. Prove that if for some integers a, b, c with $c > 0$ we have $a \equiv a' \pmod{c}$ and $b \equiv b' \pmod{c}$, then:

$$a \cdot b \equiv a' \cdot b' \pmod{c}.$$

4. Compute the equivalence class:

- Find the remainder when 5^{117} is divided by 6.
- Find the remainder when 11^{2897} is divided by 10.
- Find the remainder when 11^{1001} is divided by 100.

5. Find all integer solutions of these congruence equations:

a) $2 \cdot x \equiv 8 \pmod{10}$

b) $5 \cdot x \equiv 5 \pmod{10}$

c) $18 \cdot x \equiv 10 \pmod{14}$

d) $x^2 + 3 \cdot x + 7 \equiv 0 \pmod{5}$