1. (10 points) Show that every positive integer greater than 3 is part of at least one Pythagorean triple.

2. (10 points) Compute an integer $x$ with $x \equiv 2 \mod 17$ and $5x \equiv 6 \mod 11$.

3. (10 points) Compute integers $x, y$ with $53x + 79y = \gcd(53, 79)$.

4. (10 points) Show that if $a$ and $b$ are positive integers with $a^3 \mid b^2$, then $a \mid b$.

5. (10 points) Compute $2^{1000} \mod 17$. 