17.1- \( x \equiv 763 \)
17.2- (a) \( x \equiv 37 \) (b) \( x \equiv 559 \)
17.4- (a) Let \( m = p_1 \cdots p_n \) with \( p_i \) distinct primes. We must show that
\[
b^{1+\phi(m)} \equiv b \mod m
\]
Notice that for every prime \( q \) we have the following congruence for every \( a \):
\[
a^{1+\phi(q)} \equiv a \mod q
\]
(It is not true that \( a^{\phi(q)} \equiv 1 \mod q \) this fails for \( a \equiv 0 \mod q \))
Using the chinese remainder theorem we know there is a unique solution \( \mod p_1 \cdots p_n \) to the following system of congruences:
\[
\begin{align*}
b^{1+\phi(m)} & \equiv x \mod p_1 \\
& \vdots \\
b^{1+\phi(m)} & \equiv x \mod p_n
\end{align*}
\]
since \( b \) satisfies all congruences (by the previous remark) we get the result (remember that \( \phi \) is multiplicative).
(b) \( 6^7 \equiv 0 \mod 9 \)

18.1 FERMAT
18.2 The proof for (a) and (b) is the same as in 17.4
- Use the quadratic formula to find the roots of the polynomial \( x^2 - (p + q)x + pq = 0 \) The answer is \( p = 1453 \) \( q = 3019 \)