1. In each case, compute $\text{gcd}(m, n)$ and express it as a linear combination of $m$ and $n$.
   
   (a) $m = -231$ and $n = 150$.
   (b) $m = 532$ and $n = 378$.

2. Let $m$ and $n$ be integers. If $\text{gcd}(m, n) = 1$, let $d = \text{gcd}(m + n, m - n)$. Show that $d = 1$ or $d = 2$.

3. Let $a$ and $b$ be integers, not both 0. Prove that an integer $e$ is a linear combination of $a$ and $b$ if and only if $e$ is a multiple of $\text{gcd}(a, b)$.

4. If $\text{gcd}(m, n) = 1$ and $\text{gcd}(k, n) = 1$, show that $\text{gcd}(mk, n) = 1$.

5. Consider a prime number $p > 3$. Show that $p$ is of the form
   
   (a) $4n + 1$ or $4n + 3$ for some integer $n$.
   (b) $6n + 1$ or $6n + 5$ for some integer $n$.

**Recommended Practice Problems:** (Do not hand in)

1. Page 15, # 1. (Humphreys-Prest, 2nd Ed.)
2. Page 15, # 3. (Humphreys-Prest, 2nd Ed.)
3. Page 15, # 4. (Humphreys-Prest, 2nd Ed.)
4. Page 15, # 5. (Humphreys-Prest, 2nd Ed.)
5. Suppose that $p \geq 2$ is an integer with the following property: if $m$ and $n$ are integers with $p|m n$, either $p|m$ or $p|n$. Show that $p$ must be a prime. (Hint: use a proof by contradiction.)