Throughout, all variables represent integers unless otherwise specified.

1. Show for every integer $a$:
   
   (a) $\gcd(2a + 1, 9a + 4) = 1$
   
   (b) $\gcd(5a + 2, 7a + 3) = 1$
   
   (c) if $a$ is odd, then $\gcd(3a, 3a + 2) = 1$.

2. Prove each property of the gcd.

   (a) If $\gcd(a, b) = 1$ and $\gcd(a, c) = 1$, then $\gcd(a, bc) = 1$.
   
   (b) If $\gcd(a, b) = 1$ and $c|a$, then $\gcd(b, c) = 1$.
   
   (c) If $\gcd(a, b) = 1$, then $\gcd(ac, b) = \gcd(b, c)$.
   
   (d) If $\gcd(a, b) = 1$ and $c|a + b$, then $\gcd(a, c) = \gcd(b, c) = 1$.
   
   (e) If $\gcd(a, b) = 1$, $d|ac$, and $d|bc$, then $d|c$.
   
   (f) If $\gcd(a, b) = 1$, then $\gcd(a^2, b^2) = 1$.

3. TURN IN: 2.3.1 on p. 28.

4. 2.3.2 on p. 28.

5. TURN IN: If $(a, b) = d$, then $(a/d, b/d) = 1$.

6. TURN IN: If $a|c$ and $b|c$ and $(a, b) = 1$, then $ab|c$.

7. Find a counterexample to show that the previous statement is false if the hypothesis $(a, b) = 1$ is omitted.

**EXAM PROBLEMS**

You may use only your textbook and notes for these problems. You may not consult with anyone else or use the internet to help you solve them.

None on this assignment.