

Do the following exercises from the text:

Section 2.5: 1(b), (c), 3, 5, 6

Section 3.2: 3, 6

Section 3.4: 8

Problems not from the text:

1. Prove that any integer of the form  $3n + 2$  has a prime factor of the same form.
2. If  $p \geq 5$  is a prime number, show that  $p^2 + 2$  is composite.  
[*Hint:*  $p$  must have one of the two forms  $6k + 1$  or  $6k + 5$ . (Verify this if you use it.)]
3. (a) Given that  $p$  is a prime and  $p \mid a$ , prove that  $p^n \mid a^n$ .  
(b) If  $(a, b) = p$  where  $p$  is prime, what are the possible values of  $(a^2, b^2)$ ,  $(a^2, b)$ , and  $(a^3, b^3)$ ?