CH 1.7
2, 4, 6, 14, 16, 18a

2) Use a direct proof to show that the sum of two even integers is even.
-n is even if there exists an integer k such that n = 2k
-we have two even integers k_1 and k_2
-$n_1 + n_2$ is then equal to $2(k_1+k_2)$
-thus by the definition of an even number, n=2k, we can conclude that n_1+n_2, when both numbers are even, will return an even number.

4) Show that the additive inverse, or negative, of an even number is an even number using a direct proof.
-n is even if there exists an integer k such that n = 2k
- when negative, n = -2k or 2(-k)
-regardless of the integer substituted for integer k, it is true that it will always return an even number.

6) Use a direct proof to show that the product of two odd numbers is odd.
-n is odd if there exists an integer k such that n = 2k + 1
-we have two odd integers k_1 and k_2
-n_1*n_2 is then equal to $2(2k_1k_2+k_1+k_2)+1$
-thus by the definition of odd numbers, n =2k+1, we can conclude that n_1+n_2, when both numbers are odd, will return an odd number.

14) Prove that if x is rational and x ≠ 0, then 1/x is rational.
-A real number is rational if exists integers p and q with q ≠ 0 such that r = p/q.
-because x ≠ 0, and x is a rational number, then 1/x would return a rational number.
-thus by the definition of rational numbers, we can conclude that 1/x is rational.

16) Prove that if m and n are integers and mn is even, then m is even or n is even.
-assume "if m and n are integers and mn is even, then m is even or n is even" is false.
-so assume that m or n is odd
-n is odd if there exists an integer k such that n = 2k +1
- sub 2k +1 for n and m
-$(2k+1)(2k+1) = (2k+1)^2$
-For any value k that is plugged into $(2k+1)^2$, or $4k^2+4k+1$, it will return an odd number, and therefore not an even.
-Thus, because the negation of the conclusion of the conditional statement is true, we can conclude that the original statement is true.
18a) Prove that if n is an integer and 3n + 2 is even, then n is even using a proof by contraposition.
-assume "if n is an integer and 3n+2 is even, then n is even" is false.
-so assume that n is odd
-n is odd if there exists an integer k such that n = 2k + 1
-substitute 2k + 1 into the equation 3n +2: 3(2k +1) +2 = 6k +3 +2 = 6k + 5
-For any value k substituted into the equation 6k+5, an odd number will be returned, and therefore not an even.
-Thus, because the negation of the conclusion of the conditional statement is true, we can conclude that the original statement is true.