**Math 231 – HW 5 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Epp 2nd Ed. 3.1 1ab, 2ab, 3, 6, 8, 9, 13, 14, 15, 16, 25, 27

***Remember -- FORMAT is as important as CONTENT – get them both right!***

3.1 (1) Assume that m and n are particular integers. Justify your answers to each of the following questions:

(a) Is 6m+8n even?

(b) Is 10mn + 7 odd?

3.1 (2) Assume that r and s are particular integers. Justify your answers to each of the following questions:

(a) Is 4rs even?

(b) Is 6r+4s2+3 odd?

*Prove the statements in problems 3 and 6:*

3.1 (3) There is an integer n>5 such that 2n-1 is prime.

3.1 (6) There is a real number x so that 2x > x10.

*Prove the statements in 8 and 9 by the method of exhaustion:*

3.1 (8) Every positive even integer less than 26 can be expressed as a sum of three or fewer perfect squares. (For instance, 10 = 12 + 32, and 16 = 42.)

Theorem:

Proof:

Also: What's the first positive even integer for which the statement is NOT true?

3.1 (9) For each integer n such that 1 ≤ n ≤ 10, n2 - n + 11 is a prime number.

Theorem:

Proof:

Also: Why did the theorem stop at n = 10?

*Prove the statements in problems 13 and 14. Follow the directions for writing proofs of universal statements given in this section.*

3.1 (13) If n is any even integer, then (-1)n = 1.

Theorem:

Proof:

3.1 (14) If n is any odd integer, then (-1)n = -1.

Theorem:

Proof:

*Disprove the statements in problems 15 and 16 by giving a counterexample. Answer with a complete sentence!*

3.1 (15) For all positive integers n, if n is prime, then n is odd.

3.1 (16) For all real numbers a and b, if a < b, then a2 < b2.

*Prove the statements that are true, and give counterexamples to disprove the statements that are false:*

3.1 (25) The product of any two odd integers is odd.

3.1 (27) The difference of any two odd integers is odd.