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Set 4.1

32)

$$2 (2r + 1) + 3 (2s)$$

$$= 4r + 2 + 6s$$

$$= 2 (2r + 3s + 1)$$

n is even IF AND ONLY IF n is equal to twice an integer.

(2r + 3s + 1) is an integer and the 2 is twice that. Therefore 2a + 3b is **EVEN**.

61)

$$m = a^2$$

$$n = b^2$$

$$\begin{aligned} m + n + 2 \sqrt{mn} \\ &= a^2 + b^2 + 2 \sqrt{a^2 b^2} \\ &= a^2 + b^2 + 2ab \\ &= (a + b)^2 \end{aligned}$$

Set 4.2

20)

$$r = a/b ; s = c/d ; b \neq 0 \text{ and } d \neq 0$$

$$r = 2da / 2bd ; s = 2bc / 2bd$$

$$2da < 2bc$$

$$(2da + 2bc) / 2 = da + bc$$

(da + bc) / 2bd is a rational number between r and s

25) $r = a/b ; b \neq 0$

$$\begin{aligned} 3r^2 - 2r + 4 \\ &= 3(a/b)^2 - 2(a/b) + 4 \\ &= 3 a^2/b^2 - 2 a/b + 4 \\ &= (3a^2 - 2ab + 4ab^2) / b^2 \end{aligned}$$

the numerator is P and the denominator is Q and Q != 0

Set 4.6

28) Contraposition

- The product of two odd numbers is odd
- This means that mn is odd

If m or n is not even, then mn is not even.
Since mn is even, then m is even or n is even