

### Answer on Question #44082 – Math – Vector Calculus

Prove that  $(a + 3b) \times (a + b) + (3a - 5b) \times (a - b) = 0$

**Solution.**

$$(a + 3b) \times (a + b) = (a \times a) + 3(b \times a) + 3(b \times b) + (a \times b);$$

$$(3a - 5b) \times (a - b) = 3(a \times a) - 3(a \times b) - 5(b \times a) + 5(b \times b).$$

Since,  $(a \times a) = 0$  and  $(b \times b) = 0$ , we obtain

$$(a + 3b) \times (a + b) + (3a - 5b) \times (a - b) = 3(b \times a) + (a \times b) - 3(a \times b) - 5(b \times a).$$

As

$$(a \times b) = -(b \times a),$$

we have

$$(a + 3b) \times (a + b) + (3a - 5b) \times (a - b) = -3(a \times b) + (a \times b) - 3(a \times b) + 5(a \times b) = 0.$$