Exercise 2H

Question 1:
We know:
$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
(i) $(a + 2b + 5c)^2$
$= (a)^2 + (2b)^2 + (5c)^2 + 2(a)(2b) + 2(2b)(5c) + 2(5c)(a)$
$= a^2 + 4b^2 + 25c^2 + 4ab + 20bc + 10ac$
(ii) $(2a - b + c)^2$
$= (2a)^2 + (-b)^2 + (c)^2 + 2(2a)(-b) + 2(-b)(c) + 2(c)(2a)$
$= 4a^2 + b^2 + c^2 - 4ab - 2bc + 4ac.$
(iii) $(a - 2b - 3c)^2$
$= (a)^2 + (-2b)^2 + (-3c)^2 + 2(a)(-2b) + 2(-2b)(-3c) + 2(-3c)(a)$
$= a^2 + 4b^2 + 9c^2 - 4ab + 12bc - 6ac.$

Question 2:
We know:
$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
(i) $(2a - 5b - 7c)^2$
$= (2a)^2 + (-5b)^2 + (-7c)^2 + 2(2a)(-5b) + 2(-5b)(-7c) + 2(-7c)(2a)$
$= 4a^2 + 25b^2 + 49c^2 - 20ab + 70bc - 28ac.$
(ii) $(-3a + 4b - 5c)^2$
$= (-3a)^2 + (4b)^2 + (-5c)^2 + 2(-3a)(4b) + 2(4b)(-5c) + 2(-5c)(-3a)$
$= 9a^2 + 16b^2 + 25c^2 - 24ab - 40bc + 30ac.$
(iii) $\left(\frac{1}{2}a - \frac{1}{4}b + 2\right)^2$

$= \left(\frac{1}{2}a\right)^2 + \left(-\frac{1}{4}b\right)^2 + (2)^2 + 2\left(\frac{1}{2}a\right)\left(-\frac{1}{4}b\right) + 2\left(-\frac{1}{4}b\right)(2) + 2(2)\left(\frac{1}{2}a\right) = \frac{a^2}{4} + \frac{b^2}{16} + 4 - \frac{ab}{4} - b + 2a$

Question 3:
$4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$
$= (2x)^2 + (3y)^2 + (-4z)^2 + 2(2x)(3y) + 2(3y)(-4z) + 2(-4z)(2x)$
$= (2x + 3y - 4z)^2$

********** END **********