6.3

1) (a) $h\big((a\,x^2+b\,x+c)+(a'\,x^2+b'\,x+c')\big) = h\big((a+a')\,x^2+(b+b')\,x+(c+c')\big)$
$= (a+a')\,x^2 = a\,x^2 + a'\,x^2$
$= h(a\,x^2+b\,x+c) + h(a'\,x^2+b'\,x+c')$

(b) $h\big(\alpha\cdot(a\,x^2+b\,x+c)\big) = h(\alpha\,a\,x^2+\alpha\,b\,x+\alpha\,c) = \alpha\,a\,x^2$
$= \alpha\cdot(a\,x^2) = \alpha\cdot h(a\,x^2+b\,x+c)$

2) (a) $h\big((a\,x^2+b\,x+c)+(a'\,x^2+b'\,x+c')\big) = h\big((a+a')\,x^2+(b+b')\,x+(c+c')\big)$
$= (c+c')\,x^2 + (b+b')\,x + (a+a')$
$= c\,x^2 + c'\,x^2 + b\,x + b'\,x + a + a'$
$= (c\,x^2+b\,x+a) + (c'\,x^2+b'\,x+a')$
$= h(a\,x^2+b\,x+c) + h(a'\,x^2+b'\,x+c')$

(b) $h\big(\alpha\cdot(a\,x^2+b\,x+c)\big) = h(\alpha\,a\,x^2+\alpha\,b\,x+\alpha\,c) = \alpha\,c\,x^2+\alpha\,b\,x+\alpha\,a$
$= \alpha\cdot(c\,x^2+b\,x+a) = \alpha\cdot h(a\,x^2+b\,x+c)$

3) (a) $h\big((a\,x^2+b\,x+c)+(a'\,x^2+b'\,x+c')\big) = h\big((a+a')\,x^2+(b+b')\,x+(c+c')\big)$
$= x\,\big(2\,(a+a')\,x + (b+b')\big) + 2\,(a+a')$
$= x\,(2\,a\,x + 2\,a'\,x + b + b') + 2\,a + 2\,a'$
$= x\,(2\,a\,x+b) + x\,(2\,a'\,x+b') + 2\,a + 2\,a'$
$= \big(x\,(2\,a\,x+b) + 2\,a\big) + \big(x\,(2\,a'\,x+b') + 2\,a'\big)$
$= h(a\,x^2+b\,x+c) + h(a'\,x^2+b'\,x+c')$

(b) $h\big(\alpha\cdot(a\,x^2+b\,x+c)\big) = x\,(2\,\alpha\,a\,x+\alpha\,b) + 2\,\alpha\,a = \alpha\,x\,(2\,a\,x+b) + 2\,\alpha\,a$
$= \alpha\cdot\big(x\,(2\,a\,x+b)+2\,a\big) = \alpha\cdot h(a\,x^2+b\,x+c)$