1) $x^2 - 4x + 7$

$(x-2)^2 - 4 + 7$

$(x-2)^2 + 3$

Min point $(2, 3)$ $\therefore$ positive for all values of x

2) $n^2 - n + 3$

when $n = 3$

$(3)^2 - 3 + 3 = 9$

9 is not prime $3 \times 3 = 9$ (disproof by counter example)

3) $2n + 1 + 2n + 3$

$4n + 4$

$\underline{\underline{4(n+1)}}$

4) let $x = 1$ and $y = 2$

$(x+y)^2 = x^2 + y^2$

$(1+2)^2 = (1)^2 + (2)^2$

$3^2 = 1 + 4$

$9 = 1 + 4$

$9 = 5$

disproof by counter example.

5a) $n=1$ $(1)^2 + (1) + 11 = 13$ (prime)

$n=2$ $(2)^2 + (2) + 11 = 17$ (prime)

$n=3$ $(3)^2 + (3) + 11 = 23$ (prime)

$n=4$ $(4)^2 + (4) + 11 = 31$ (prime)

$n=5$ $(5)^2 + (5) + 11 = 41$ (prime)

proof by exhaustion.

b) $n=10$ $(10)^2 + 10 + 11 = 121$ (not prime $11 \times 11 = 121$)

6) even positive integers less than 10 2, 4, 6, 8

$2 + 4 = 6$	(even)	$2 + 2 = 4$	(even)
$2 + 6 = 8$	(even)	$4 + 4 = 8$	(even)
$2 + 8 = 10$	(even)	$6 + 6 = 12$	(even)
$4 + 6 = 10$	(even)	$8 + 8 = 16$	(even)
$4 + 8 = 12$	(even)		
$6 + 8 = 14$	(even)		

7) $2n + 5$

when $n = 10$ $2(10) + 5 = 25$ (True)

when $n = -10$ $2(-10) + 5 = -15$ (Not True)

The statement is sometimes true.

8) $(2n+3)^2 - (2n-3)^2$

$(2n+3)(2n+3) - (2n-3)(2n-3)$

$(4n^2+6n+6n+9) - (4n^2-6n-6n+9)$

$(4n^2+12n+9) - (4n^2-12n+9)$

$4n^2+12n+9-4n^2+12n-9$

$24n$

$\underline{\underline{6(4n)}}$

9) $(2n+1)^2 + (2n+3)^2$

$(2n+1)(2n+1) + (2n+3)(2n+3)$

$4n^2+2n+2n+1+4n^2+6n+6n+9$

$8n^2+16n+10$

$8n^2+16n+8+2$

$\underline{\underline{8(n^2+2n+1)+2}}$

10) $n^2+7n+15 > n+3$

$n^2+6n+12 > 0$

$(n+3)^2-9+12 > 0$

$(n+3)^2+3 > 0$

$(n+3)^2+3$ has a minimum value when $n=-3$

min value $= 3$

$3 > 0$

$\therefore$ $n^2+7n+15 > n+3$ for all values of n