

1a. $U_n = n(n+1)$. b) $U_n = 2n+3$

$U_1 = 1(1+1) = 2$ $U_1 = 2 \cdot 1 + 3 = 5$
 $U_2 = 2(2+1) = 6$ $U_2 = 2 \cdot 2 + 3 = 7$
 $U_3 = 3(3+1) = 12$ $U_3 = 2 \cdot 3 + 3 = 9$
 $U_4 = 4(4+1) = 20$ $U_4 = 2 \cdot 4 + 3 = 11$
 $U_5 = 5(5+1) = 30$ $U_5 = 2 \cdot 5 + 3 = 13$

c) $U_n = n^2 - 3$

$U_1 = 1^2 - 3 = -2$
 $U_2 = 2^2 - 3 = 1$
 $U_3 = 3^2 - 3 = 6$
 $U_4 = 4^2 - 3 = 13$
 $U_5 = 5^2 - 3 = 22$

2a) $\sum_{k=1}^{10} 2k = 2 \cdot 1 + 2 \cdot 2 + 2 \cdot 3 + 2 \cdot 4 + 2 \cdot 5 + 2 \cdot 6 + 2 \cdot 7 + 2 \cdot 8 + 2 \cdot 9 + 2 \cdot 10$
 $= 2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20 = 110$

b) $\sum_{i=1}^5 2i+3 = 2 \cdot 1 + 3 + 2 \cdot 2 + 3 + 2 \cdot 3 + 3 + 2 \cdot 4 + 3 + 2 \cdot 5 + 3$
 $= 2 + 5 + 7 + 9 + 11 + 13 = 45$

c) $\sum_{a=1}^5 a^2 + a = 1^2 + 1 + 2^2 + 2 + 3^2 + 3 + 4^2 + 4 + 5^2 + 5$
 $= 2 + 6 + 12 + 20 + 30 = 70$

3a. 8, 11, 14, ..., U_{15}

$a = 8$, $b = 3$, U_{15}

$U_{15} = 8 + (15-1) \cdot 3$
 $= 8 + 14 \cdot 3 = 50$

3b. -5, 1, 3, ..., U_{20}

$a = -5$, $b = 4$, U_{20}

$U_{20} = (-5) + (20-1) \cdot 4$
 $= -5 + 19 \cdot 4 = 71$

3c. 5, 9, 13, ..., U_{15}

$a = 5$, $b = 4$, U_{15}

$U_{15} = 5 + (15-1) \cdot 4$
 $= 5 + 14 \cdot 4 = 61$

4a. 2, 5, 8, ..., 41

$U_n = a + (n-1) \cdot b$

$41 = 2 + (n-1) \cdot 3$

$= 2 + 3n - 3 =$

$= 3n - 1 = 41$

$3n = 42$

$n = 14$

4b. 2, 6, 10, ..., 158

$U_n = a + (n-1) \cdot b$

$158 = 2 + (n-1) \cdot 4$

$= 2 + 4n - 4 =$

$= 4n - 2 = 158$

$4n = 160$

$n = 40$

4c. 15, 12, 9, ..., -60

$U_n = a + (n-1) \cdot b$

$-60 = 15 + (n-1) \cdot (-3)$

$= 15 - 3n + 3 =$

$-60 = 18 - 3n =$

$3n = 18 + 60 = 78$

$n = 26$

5a) $U_3 = 17$, $U_8 = 2$

$U_3: a + 2b = 17$

$U_8: a + 7b = 2$

$\underline{-5b: 15}$

$b = -3$

$a + 2(-3) = 17$

$a = 17 + 6$

$a = 23$

$U_n = 23 + (n-1) \cdot (-3)$

$= 23 - 3n + 3$

$= 26 - 3n$

5b. $U_5 = 14$, $U_8 = 23$

$U_5 = a + 4b = 14$

$U_8 = a + 7b = 23$

$\underline{-3b: -9}$

$b = 3$

$a + 4 \cdot 3 = 14$

$a = 2$

$U_n = 2 + (n-1) \cdot 3$

$= 2 + 3n - 3$

$= 3n - 1$

5c. $U_3 = 16$, $U_5 = 20$

$U_3 = a + 2b = 16$

$U_5 = a + 4b = 20$

$\underline{-2b: -4}$

$b = 2$

$a + 2 \cdot 2 = 16$

$a + 4 = 16$

$a = 12$

$U_n = (2 + (n-1) \cdot 2)$

$= 2 + 2n - 2$

$= 2n$