1. (1) 初項 1, 公差 3 の等差数列なので $a_n=3n-2$

よって

$$\sum_{k=1}^{n} a_k = \underline{\sum_{k=1}^{n}(3k-2)}$$

(2) 初項 1, 公比 3 の等比数列なので $a_n = 3^{n-1}$

よって

$$\sum_{k=1}^{n} a_k = \underline{\sum_{k=1}^{n} 3^{k-1}}$$

2. (1)

$$\sum_{k=1}^{n}(2k-2)$$
$$= 2\cdot\frac{1}{2}n(n+1) - 2n$$
$$= \underline{n(n-1)}$$

(2)

$$\sum_{k=1}^{n}(3k-1)^2 = \sum_{k=1}^{n}(9k^2-6k+1)$$
$$= \cancel{9}^{3}\cdot\frac{1}{\cancel{6}_{2}}n(n+1)(2n+1) - \cancel{6}^{3}\cdot\frac{1}{\cancel{2}_{1}}n(n+1) + n$$
$$= \frac{1}{2}n\{3(n+1)(2n+1) - 6(n+1) + 2\}$$
$$= \frac{1}{2}n\{3(2n^2+3n+1) - 6(n+1) + 2\}$$
$$= \underline{\frac{1}{2}n(6n^2+3n-1)}$$

(3)

$$\sum_{k=1}^{n}k(k+1)(2k+1) = \sum_{k=1}^{n}(2k^3+3k^2+k)$$
$$= 2\cdot\frac{1}{4}n^2(n+1)^2 + 3\cdot\frac{1}{6}n(n+1)(2n+1) + \frac{1}{2}n(n+1)$$
$$= \frac{1}{2}n^2(n+1)^2 + \frac{1}{2}n(n+1)(2n+1) + \frac{1}{2}n(n+1)$$
$$= \frac{1}{2}n(n+1)\{n(n+1) + (2n+1) + 1\}$$
$$= \frac{1}{2}n(n+1)(n^2+3n+2) = \underline{\frac{1}{2}n(n+1)^2(n+2)}$$

3. (1) 第k項は

$$2+4+6+\cdots+2k$$
$$= \frac{1}{2}k(k+1)\cdot 2 = k(k+1)$$

よって和は

$$\sum_{k=1}^{n}k(k+1)$$
$$= \sum_{k=1}^{n}(k^2+k)$$
$$= \frac{1}{6}n(n+1)(2n+1) + \frac{1}{2}n(n+1)$$
$$= \frac{1}{6}n(n+1)\{(2n+1)+3\}$$
$$= \frac{1}{6}n(n+1)\cdot 2(n+2)$$
$$= \underline{\frac{1}{3}n(n+1)(n+2)}$$

(2) 第k項は

$$1+3+3^2+\cdots+3^{k-1} = \frac{3^k-1}{3-1}$$
$$= \frac{1}{2}(3^k-1)$$

よって和は

$$\sum_{k=1}^{n}\frac{1}{2}(3^k-1) = \frac{1}{2}\sum_{k=1}^{n}3^k - \frac{1}{2}\sum_{k=1}^{n}$$
$$= \frac{3}{2}\sum_{k=1}^{n}3^{k-1} - \frac{1}{2}n$$
$$= \frac{3}{2}\cdot\frac{3^n-1}{3-1} - \frac{1}{2}n$$
$$= \underline{\frac{3}{4}(3^n-1) - \frac{1}{2}n}$$