1 Use Θ notation to express the statement

$$4n^6 \quad \leq \quad 17n^6 - 45n^3 + 2n + 8 \leq 30n^6, n \geq 3$$

Let $A = 4$, $B = 30$ and $k = 3$ then the statement translates to

$$An^6 \quad \leq 17n^6 - 45n^3 + 2n + 8 \quad \leq Bn^6, n \geq k$$

hence by the definition of Θ notation $17n^6 - 45n^3 + 2n + 8$ is $\Theta(n^6)$.

2 Use Ω notation to express the statement

1. Use Ω notation to expres the statement

   $$\frac{11}{4}n^2 \quad \leq \quad 3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2, n \geq 2$$

   Let $A = \frac{11}{4}$ and $k = 2$ then $An^2 \leq 3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2, n \geq 2$ then the statement translates to

   $$An^2 \quad \leq \quad 3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2, n \geq k$$

   which by the definition of Ω notation, $3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2$ is $\Omega(n^2)$.

2. Use O notation to express the statement

   $$0 \quad \leq \quad 3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2 \leq 6n^2, n \geq 1$$

   Let $A = 6$ and $k = 1$ then the statement translates to

   $$0 \quad \leq 3 \cdot (\lfloor \tfrac{n}{4} \rfloor)^2 + 5n^2 \quad \leq An^2, n \geq k$$

   which by the defnition of O notation, $3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2$ is $O(n^2)$.

3. Justify the statement: $3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2$ is $\Theta(n^2)$.
   Let $A = \frac{11}{4}, B = 6$ and $k = 2$ then $A \cdot n^2 \leq 3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2 \leq Bn^2, n \geq k$ which by the definition of Θ notation, $3 \cdot (\lfloor \frac{n}{4} \rfloor)^2 + 5n^2$ is $\Theta(n^2)$.