Q1 - Mergesort recurrence:

\[ T(1) = c \]
\[ T(n) = 2 \cdot T(n/2) + n \text{ for } n > 1 \]
Q2 - Closed form solution for f(n):

\[
\begin{align*}
  f(0) &= 1 \\
  f(n) &= f(n - 1) + 2n - 1 \text{ for } n > 0
\end{align*}
\]
Q3 - Big-O Bound:

```python
for (i = 1; i <= n; i = i*3):
    for (j = n; j > 0; j = j / 2):
        print(CSE 101)
```
Q4 - Graph Questions:

(a) i.

ii.

iii.

(b) i.

ii.

iii.

(c) i.

ii.

iii.
Q5 - Mathematical Induction:

\[ 1^3 + 2^3 + \ldots + n^3 = \left( \frac{n(n + 1)}{2} \right)^2 \]

Base Case:

Inductive Hypothesis:

Inductive Step: