Problem #1:

Solve the following recurrence exactly.

\[ t(n) = \begin{cases} 
9n^2 - 15n + 106 & \text{if } n = 0, 1 \text{ or } 2 \\
t(n-1) + 2t(n-2) - 2t(n-3) & \text{otherwise}
\end{cases} \]

Problem #2

Solve the following recurrence exactly, using repetitive substitutions.

\[ t(n) = 4t(n-1) - 15 \quad \text{for all } n \geq 2, \text{ where } t(1) = 5 \]

Problem #3:

Solve the following recurrence exactly.

\[ t(n) = \begin{cases} 
n + 1 & \text{if } n = 0, \text{ or } 1 \\
3t(n-1) - 2t(n-2) + 3 \times 2^{n-2} & \text{otherwise}
\end{cases} \]

Problem #4.

Solve the following recurrence exactly for \( n \) a power of 2.

\[ T(n) = \begin{cases} 
1 & \text{if } n = 1 \\
4T(n/2) + n & \text{otherwise}
\end{cases} \]

Problem #5.

Solve the following recurrence exactly for \( n \) a power of 2.

\[ T(n) = \begin{cases} 
1 & \text{if } n = 1 \\
2T(n/2) + \log n & \text{otherwise}
\end{cases} \]

Note: In each problem, express your answer as simply as possible using the \( \Theta \) notation. It is just fine if your general solution is not a non-decreasing function.