Problem 4

a) $\sum_{i=1}^{n+12} \left(c_1 + \sum_{j=389}^{20100} \sum_{k=2i}^{3i} c_2 \right)$

$= \sum_{i=1}^{n+12} \left(c_1 + \sum_{i=389}^{20100} i \, c_2 \right)$

$= \sum_{i=1}^{n+12} \left(c_1 + 19711 i \, c_2 \right)$

$= (n+12) \cdot c_1 + 19711 \cdot \frac{(n+13) \cdot (n+12)}{2} \in \Theta(n^2)$

b) $\sum_{i=1}^{\text{ceiling} (\log(n))} \sum_{j=1}^{i} \sum_{k=1}^{10} c$

$= \sum_{i=1}^{\text{ceiling} (\log(n))} \sum_{j=1}^{i} 10 \, c$

$= \sum_{i=1}^{\text{ceiling} (\log(n))} 10 i \cdot c$

$=$

c) $\sum_{i=1}^{\text{sqr}(n)} \sum_{j=1}^{\text{ceiling} (\log(i))} \cdot c$

$=$