Max Chow

Problem 3

(a) while $(i<n)$ { $i = i \times i$; }

i^2 $\quad 2^{2^k} < n \quad k < \log(\log n)$ $\quad \boxed{\Theta(\log(\log n))}$

(b) $\sum_{i=1}^{n} \Theta(1) + \sum_{i=1}^{3} \Theta(i^3)$

$\Theta(n) + \sum_{i=1}^{k} \Theta(i\sqrt{n})^3 \qquad i^3\Theta(\sqrt{n^7}) \quad i^3$ is a constant

$\boxed{\Theta(\sqrt{n^7})}$

(c) $\sum_{i}^{n} \left(\sum_{i}^{c} \Theta(1) + \sum_{i}^{n-c} \Theta(\frac{n}{2}) \right)$ worst case if statement calls n amount of times

$\Theta(\frac{n^2}{2}) \Rightarrow \Theta(n^2)$

(d)

n	#C
10	1
20	2
30	3

$C = 10 \cdot (\frac{3}{2})^i$

triggers at

10, 15, 23, 35, 53

5 8 12 18

$\sum_{i=0}^{\log_{\frac{3}{2}} n} C \qquad \sum_{i=0}^{C} (\Theta(1))$

$\sum_{i=0}^{\log_{\frac{3}{2}} n} \Theta(10(\frac{3}{2})^i) = \boxed{\Theta(n)}$