Question 1:

a) By the big-Oh definition, $f(n) \leq cg(n)$, for $n \geq n_0$.

$5n^3+ 2n^2+ 3n <(5+2+3)n^3=cn^3$. for $c=10$ when $n \geq n_0 = 1$.

b) By the big-Theta definition, $c^{'}g(n) \leq f(n) \leq c^{''}g(n)$, for $n \geq n_0$.

$n< (7n^2+ 2n - 8)^{1/2}<(7+2)n$. for $c^{'}=1$ $c^{''}=9$ when $n \geq n_0 = 1$.

c) d(n)=O(f(n)) —d(n)≤ $cf(n)$,

e(n)=O(g(n)) —e(n) ≤ $cg(n)$

$cf(n)$* $cg(n)$=c_{NEW}f(n)g(n)

d(n)e(n) ≤c_{NEW}f(n)g(n)

d(n)e(n) is O(f(n)g(n))

Question 2:

1. Θ (n^2)
2. Θ (n)
3. Θ (nlogn)
4. Θ (n)