<u>Math 2534   Partial Order and Big O notation.</u>

Write up problem clearly and precisely. State definitions as needed.

Problem 1:

Let A be a set and P(A) be the power set of A. Let C and D be elements of P(A). Define the relation R to be CRD if $C \subseteq D$. Show that R is a partial order relation.

Problem 2:

If A = { 2, 3, 4, 5, 6, 8, 9, 12, 15, 18} For all a, b in A, aRb iff a divides b. Draw a Hasse Diagram representing R and express R as a set of ordered pairs.

Definition of Big O notation: Let S be a set of functions so that all functions in the set have the same domain (N, Z, R). Let f(x) and g(x) be in S. Then f(x) is said to be Big O of g(x) if there exist positive values C and K so that $|f(x)| \le C|g(x)|$ for all x > k.

Problem 3:

Let $f(x) = 2x^2 + 3x + 6$ and $g(x) = x^2, x \in Z$, and show that f(x) is Big-O of g(x) by satisfying the definition.

Problem 4:

Let $f(n) = 2^n$ and $g(n) = n!$ for $n \in N$, and show that f(n) is Big-O of g(n) by satisfying the definition.

Comments: You are finding an upper bound for the set S (a more efficient function) by comparing the functions in S. This can produce a partial order on the set S.