**Mason Shepherd**

**Homework 2: due January 29th 3PM.**

R-4.8 [5 pts] Order the following functions by asymptotic growth rate:

4*n*log*n*+2*n,* 210*,* 2log*n,* 3*n*+100log*n,* 4*n,* 2*n,*   *n*2 + 10*n, n*3*,* *n* log *n*

Ans: (Lowest to Highest)

(Constant) 210

(Linear) 2log*n*, 3*n* + 100log*n*, 4*n*

(N-Log-N) *n*log*n*, 4*n*log*n* + 2*n*

(Quadratic) *n*2 + 10*n*

(Cubic) *n*3

(Exponential) 2*n*

R-4.9  [5 pts] Give a big-Oh characterization, in terms of *n*, of the running time of the example1  method shown in Code Fragment 4.12 (on page 183 of the textbook).

Ans: f(*n*) is ***O***(*n*)

R-4.13 [5 pts] Give a big-Oh characterization, in terms of *n*, of the running time of the example5 method shown in Code Fragment 4.12 (on page 183 of the textbook).

Ans: f(*n*) is ***O***(*n*3)

R-4.26 [5 pts] Use definition of big-Omega to prove that *n*log*n* is Ω(*n*).

Ans: *n*log*n* is Ω(*n*); for *n*0=2, *c*=1

(2)log2(2) = 2 ≥ (2)

R-4.15 [10 pts] Prove that if *d*(*n*) is *O*(*f*(*n*)) and *e*(*n*) is *O*(*g*(*n*)), then the product *d*(*n*)*e*(*n*) is *O*( *f* (*n*)*g*(*n*)) (hint: use definition of big-Oh to prove).

Ans: if *d*(*n*) ≤ *c* \* *f*(*n*), for some constant *c* > 0 and for *n* ≥ *n*0.

and *e*(*n*) ≤ *b* \* *g*(*n*), for some constant *b* > 0 and for *n* ≥ *n*0.

then, *e*(*n*)*d*(*n*) ≤ *k* \* *g*(*n*)*f*(*n*), for some constant *k* = *c*\**d* > 0 and for *n* ≥ *n*0.

t4: *e*(*n*)*d*(*n*) is ***O***(g(*n*)*f*(*n*))