[40] **Homework 3**: *Big-Oh*

Due: September 27 by the end of the class.

[10] Which function grows faster (justify your answer):

   (i) $n^{\ln n}$ or $(\ln n)^n$?

   (ii) $n^{\ln \ln \ln n}$ or $(\ln n)!$?

[10] Prove or disprove

$$\sum_{i=1}^{n} i^5 = \Theta(n^5).$$

[10] Evaluate

$$\left(n + 2 + O(n^{-1})\right)^n$$

with the relative error $O(n^{-1})$ (i.e., your answer should look like

$$\left(n + 2 + O(n^{-1})\right)^n = f(n)\left(1 + O(n^{-1})\right)$$

for some function $f(n)$.

[10] For the following pseudo-code determine the value returned in terms of n. Use big-Oh notation. Show your work.

```
int function sqr (int n)
if (n ≤ 2)
then return(1)
else return(1 + sqr(√n))
```