Homework 3: Big-Oh

Due: September 27 by the end of the class.

Which function grows faster (justify your answer):

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

Prove or disprove

$$\sum_{i=1}^{n} i^5 = \Theta(n^6).$$

Evaluate

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

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

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

for some function $f(n)$.

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

```c
int function sqr (int n)
if (n <= 2)
then return(1)
else return(1 + sqr(\sqrt{n}))
```