3.2 The Growth of Functions

3.2 pg 216 # 1

Determine whether each of these functions is $O(x)$.

a) $f(x) = 10$

b) $f(x) = 3x + 7$

c) $f(x) = x^2 + x + 1$

d) $f(x) = 5 \log x$

3.2 pg 216 # 5

Show that $(x^2 + 1)/(x + 1)$ is $O(x)$

3.2 pg 216 # 7

Find the least integer n such that $f(x)$ is $O(x^n)$ for each of these functions.

a) $f(x) = 2x^3 + x^2 \log x$

b) $f(x) = 3x^3 + (\log x)^4$

c) $f(x) = (x^4 + x^2 + 1)/(x^3 + 1)$

3.2 pg 217 # 25

Give as good a big-O estimate as possible for each of these functions

a) $(n^2 + 8)(n + 1)$

b) $(n \log n + n^2)(n^3 + 2)$

3.2 pg 216 # 21

Arrange the functions $\sqrt{n}, 1000 \log n, n \log n, 2n!, 2^n, 3^n,$ and $n^2/1000000$ in a list so that each function is big-O of the next function.

3.2 pg 217 # 29

Determine whether each of these functions is $\Omega(x^2)$

c) $f(x) = x \log x$

e) $f(x) = 2^x$