Homework 2

1. Using either the properties of limits and/or the squeezing principle, find the following limits:

$$(a) \quad \lim_{n\to\infty} \frac{3n^4 + (-1)^n n^2 + 1}{4n^4 + 3n^3 + 2n}$$

$$(b) \quad \lim_{n\to\infty} \frac{n^2 + 2}{n^2\sqrt{n} + 1}$$

$$(c) \quad \lim_{n\to\infty} \frac{2^n + 3}{3^n + 2}$$

$$(d) \quad \lim_{n\to\infty} \sqrt[n]{3}$$

$$(e) \quad \lim_{n\to\infty} (2^n + 3^n)^{1/n}$$

$$(f) \quad \lim_{n\to\infty} \frac{\cos n}{n} = 0$$

converges.

2. Let $(a_n)_{n\geq 1}$ be a sequence that converges to 0 and let $(b_n)_{n\geq 1}$ be a bounded sequence. Prove that the sequence $(a_n b_n)_{n\geq 1}$ converges and find its limit.