

MATH 251 (PHILLIPS): WRITTEN HOMEWORK 2.

This sheet is part of the homework for Week 2, and is due in class on Friday 18 January 2008.

All the requirements in the sheet on general instructions for homework apply. In particular, show your work (unlike WebAssign), give exact answers (not decimal approximations; again, unlike WebAssign), and use correct notation. Some of the grade will be based on correctness of notation in the work shown.

1. Prove that there exists a real solution to the equation $-x^7 - x + 1 = 0$. Give a complete justification for any theorems that you use, in particular being sure to check that the hypotheses hold.

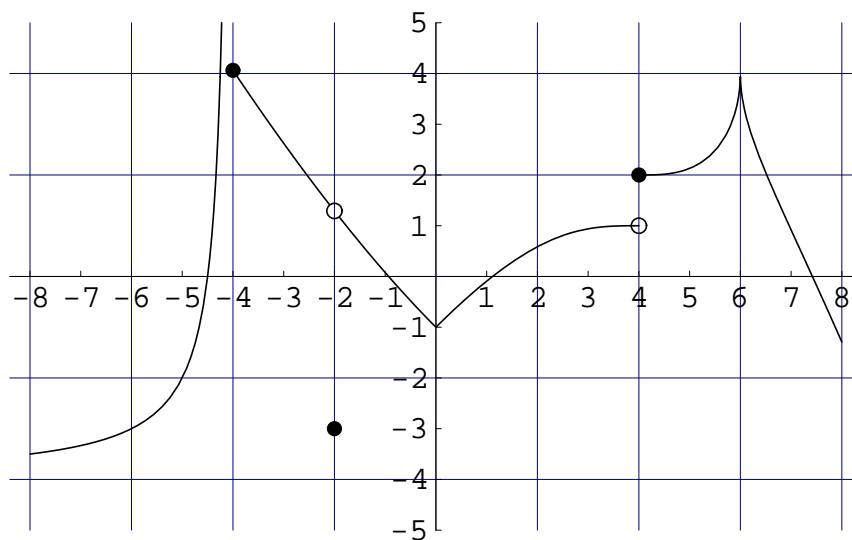
2. Find the exact values of the following limits, or explain why they do not exist:

(a) $\lim_{x \rightarrow 9^+} \frac{f(x)}{x-9}$, given that $\lim_{x \rightarrow 9} f(x) = -4$.

(b) $\lim_{x \rightarrow 3} \frac{\sqrt{3x-3}}{x-3}$.

(c) $\lim_{x \rightarrow 0} \left[\frac{7}{12} + x^2 \cos \left(\frac{1}{x^{1/3}} \right) \right]$

3. For the function $y = q(x)$ graphed below, answer the following questions:



(a) List all numbers a in $(-8, 8)$ such that q is not continuous at a . Give reasons.

(b) Find the largest interval containing -3 on which q is continuous.