Mate 3021 practice problems

Due 24/01

Exercises 5, 10, 11, 12, 16, 17 (sketch the graph of the function *fog*) of § 1.2.

– Using the graphical method shown in class, find the direct image of the interval [–2,1] under the function $x \longmapsto -x^2$. Use colours.

– Same task, but now for the function $x \longmapsto -(x-1)^2$.

– Using the graphical method, solve the inequality $(x+1)^2 \geq 2$ (the "solution" is a set of x-values, express it as an union of intervals).

Due 31/01

Exercises 25, 26, 37, 38, 39 of § 1.2. Exercise 45: find the range graphically, since the range is the same as the direct image of the whole domain of f under f. Exercises 46, 51. Exercises 69, 72, 76, 78, 82, 84, 86, 92, 94, 100.

Due 7/02

§ 2.1: two of pbs 5–10, 11, 12, 14, two of 15–18, two of 19–24, two of 25–30, three of 35–46, three of 47–58.

Due 14/02

§ 2.2: problems from syllabus. Do at least ten from the sequence 25–51, and attempt at least as many even-numbered problems as odd-numbered ones, despite what it says in the syllabus.

Due 21/02

§ 3.1: do ten from problems 1–32, and the rest of the problems from syllabus. Identify those problems where the limit laws do not apply directly, but where a transformation is needed first (e.g., problem 47).

§ 3.3: all problems from syllabus.

Due 26/02

§ 3.2: twenty-four problems from syllabus.

Due 5/03

We have learnt to sketch hyperbolæ, without graphing device and without tabulating, using simply the asymptotes, and the position of the branches with respect to the asymptotes. On pp. 36–37, hyperbolæ occur in some exercises. Practise drawing them speedily.

We have learnt to solve inequalities graphically. This involves sketching the function (with certain, but not all of the points to be determined exactly), the use of colour pencils, and apparently, some concentration. See exercise above (due 24/01), the practice test, and some quiz problems. Practise this skill.

Now combine both skills: choose two of the hyperbolæ from the previous exercise, and, if the hyperbola has equation $y = f(x)$, find values a and b such that each of the inequalities $f(x) \geq a$ and $f(x) \leq b$ has as solution the union of two x-intervals.

For solving quadratic equations, I discourage the use of the quadratic formula. Any text on precalculus (I assume you know how to use the index) has a section on completing the square. In some of problems 93–110 of § 2.2, the equation to find the fixed point is a quadratic equation. Solve each of these by completing the square.

§ 3.4: all problems from syllabus. Parts (b) and (c) of problems 1, 2, 4 can be solved without access to a graphing calculator.

Due 12/03

§ 4.1: all problems from syllabus.

§ 4.2: all problems from syllabus.

Due 17/03

§ 4.3: all problems from syllabus. Do not skip problem 92 or 93.

Due 26/03

§ 4.4: all thirty problems from syllabus.

Due 2/04

§ 4.5: all exercises from syllabus.

§ 4.6: all exercises from syllabus, notably, 53–57. What is the half-life referred to in problem 68?

Due 9/04

§ 4.7: all problems from syllabus. In problems 7–22, check first that the function has an inverse; a sufficient criterion is that the derivative be of one sign. What step do problems 7–22 have in common? In problem 61 (b), use the fact that if g is continuous, $g(a) = \lim_{x->a} g(x)$.

Due 28/04

§ 5.1: problems from syllabus. Problems 9–12 refer to sketching a graph, not finding a formula. For problems 13–18, you do not need a graphing calculator. Do not skip problems 35–55, even if they look unappealing (to the student of good taste, they should not).

Due 5/05

§ 5.2: all problems from syllabus. You may skip 23.

Due 9/05

§ 5.3: all problems from syllabus.

§ 5.4: all problems from syllabus. Problem 11 is particularly important. The efficient way of computing the minimum distance is as in (c), not (b) (why?) See also pb 13.

Practice

§ 5.5: all problems from syllabus. In each of thsese problems, see whether another rule applies.