Final Exam (Take-home)

Due Thursday 19 December, 2013, at 5:00 pm in my office box

135 points total

Rules. You may not talk or communicate about this exam with any person other than me, Ed Bueler. However, please do contact me with your questions, either in-person at my office, or by email:

`elbueler@alaska.edu`

References to the textbook (Ross, *Elementary Analysis*, 2nd ed.) should be clear and specific.

Other than the textbook, you may not use reference books (print or electronic) or other references, including online sources. You may not search out, online or otherwise, solutions to the problems below. As stated on the revised syllabus at

`www.dms.uaf.edu/~bueler/M401F13syllabus.htm`

this Final Exam is 20% of your course grade.

Exercise 14.12 (*10 pts*)

Exercise 18.8 (*10 pts*)

Exercise 24.17 (*10 pts*)

Exercise 28.4 (*10 pts*)

Exercise 28.14 (*10 pts*)

Exercise 29.2 (*10 pts*)

Exercise 29.5 (*10 pts*)

Exercise 29.13 (*10 pts*)

Exercise 32.2 (*10 pts*)

Exercise 32.7 (*15 pts*)

Exercise 33.4 (*10 pts*)

F1 (*10 pts*) Prove by a careful induction argument, using the style shown in the examples in section 1 of the textbook, that for all $n \in \mathbb{N}$, if $a, b \in \mathbb{R}$ then

$$a^n - b^n = (a-b)\sum_{k=1}^{n} a^{n-k}b^{k-1}.$$

(*You do not have to identify the axioms you use, that is, there is no need to mention N1,...,O5, listed in section 1 or 3, when you use them.*)

F2 (*10 pts*) Let $a, b \in \mathbb{R}$. Given an interval on the real line, either $[a, b]$ or $[a, b)$ or $(a, b]$ or (a, b), find a power series that has that exact interval as its interval of convergence. (*Yes, please address each of the four cases.*)