

3-1-1988

I'll Carry My Coals Where They're Needed, Professor Henriksen

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Recommended Citation

Stein, Sherman K. (1988) "I'll Carry My Coals Where They're Needed, Professor Henriksen," *Humanistic Mathematics Network Journal*: Iss. 2, Article 4.

Available at: <http://scholarship.claremont.edu/hmnj/vol1/iss2/4>

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Sherman Stein replies

I'LL CARRY MY COALS WHERE THEY'RE NEEDED,
PROFESSOR HENRIKSEN

Yes, as Prof. Henriksen reminds us, there are external boundary conditions on what we can do. But I would not put the whole blame on those departments for which we offer service courses.

Even with service courses there may be more leeway than we imagine. The engineering faculty I've spoken with do want their students to understand what the derivative, definite integral, and Stokes' theorem mean, for these concepts are used not simply to aid computations but as words in a language. That suggests that we can and should assign conceptual exercises, even if they involve writing. However, it does not mean that we can turn calculus into a jungle of epsilons and deltas.

Perhaps the constraints that Prof. Henriksen refers to are most constricting in our freshman service courses, but even there we may assign a small project that requires exploration, thought, and writing. We should then be prepared to read the results and criticize them in detail, even reading revisions. The main constraint here is one of time--our own.

I suspect that the style in which we conduct our service courses may insidiously corrupt the way we teach even the courses for our majors: we tend to think mainly in terms of topics rather than in terms of changes we want to occur in the student's way of dealing with problems. For instance, in an upper-division algebra course we may state and prove that a subgroup of a cyclic group is cyclic instead of giving the students the time and opportunity to find on their own "all the subgroups of cyclic groups."

I confess that I have a tendency to teach as I was taught, to lose sight of the main goal in the hurly burly of lectures, office hours, committee meetings, and exams. For me, certainly, and maybe for others, some of the constraints are subliminal and internal. If so, we should every so often stop and think about what we are doing.

As an ancient Chinese sage, a master of the two-fold way, once observed, "Civilization advances in two ways: by extending the number of important operations that can be performed without thinking about them, and also by thinking about important operations we perform too often without thinking about them."

