

Administrivia

- Reminder: Quiz 3 Wednesday. Likely topic is loops (`for`, `while`, and `do while`). To prepare, you could do worse than just working on the next homework.

Slide 1

More Administrivia

- If you get one of those mailed-every-Saturday messages about disk space usage on your account, you probably should pay attention: More than one of you has already run into problems related to being over quota.
- The message has a link to a "FAQ" page with more information, which I've just updated a bit. If you don't know what the message means or what to do about it, read this FAQ first and then feel free to ask.
- "TL;DR" summary: In a terminal window, first type `quota` to see current usage. Then type `sorted-disk-usage .` to see where the space is being used. If the last (largest) things shown are `.mozilla` or `.cash` (*highly likely*), next try `clear-browser-caches` and then check whether that helped with `quota` again. If that doesn't fix things, read that FAQ or ask.

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Minute Essay From Last Lecture

Slide 3

- No particular trends in responses, but:
- One person mentioned having to remember to check a lot of different inputs. It's not trivial! Ideally there should be at least one test input that tries each "path" through your code. There should also be tests for anything mentioned in the writeup (e.g., "print an error message if input is negative").
- Another mentioned having trouble applying what we do in class to homework problems. Not sure what to suggest there, other than looking for examples that seem similar, and "practice, practice, ..."?

Numerical Computation

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- A big use of computers is in solving (exactly or approximately) mathematical problems — "numerical computation" or "numerical analysis". Matlab is one tool for this, and/or you can write your own programs in a general-purpose programming language. Often (maybe always?) these involve various forms of repetition.
- An example is "numerical integration", in which you approximate a definite integral (area under a curve) by computing areas of rectangles and adding them up. As an example ...

Numerical Integration — Approximating π

- An exact value of π can be obtained by evaluating

$$\int_0^1 \frac{4}{1+x^2} dx$$

(If you don't remember, or never learned, what this means, no worries. For purposes of this class all that matters is how we do the approximation.)

- So we could approximate π by approximating the area under this curve.
- (Aside: This turns out to be a good introductory example of “parallel programming” because it lends itself to solutions involving multiple processing elements. !)
- How does this look in C...

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Another Loop Example — Loop Until “Convergence”

- It's not atypical to want to repeat something until some computation “converges”.
- As an example, we could revise the example we just wrote to do the computation repeatedly until some condition is reached.

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Minute Essay

- Can you think of problems that interest you for which it seems like a program using repetition (either recursion or a loop) would be useful?

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