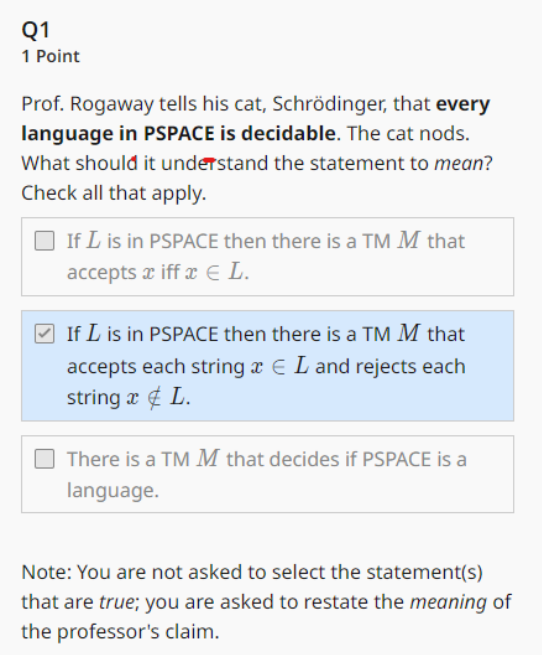
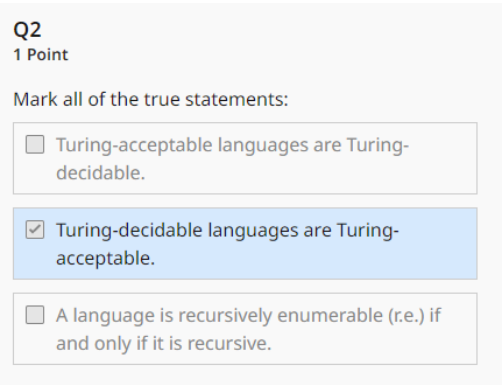
ECS 120 – Spring 2023 – Quiz #7



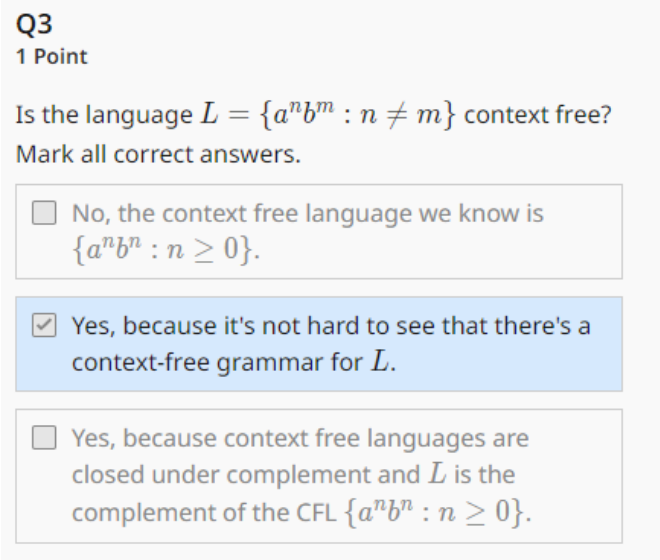
The first choice is what it would mean to say that it's (Turing) acceptable – not what it means to say that it's (Turing) decidable.

The second answer is a perfect translation of what it means to say that it's decidable.

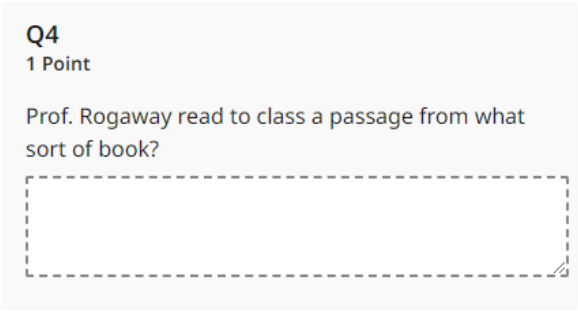
The third answer is total nonsense: "decides if PSPACE (a class of languages, you can infer from the setup) is a language"?!



- An r.e. language might or might not be decidable
- sure
- Not at all: recursive languages are a (proper) subset of r.e. languages, they're not the same thing



- You know that that language is context free, but how is that responsive / relevant to the question? It's not
- Yep
  S → A T | T B //excess a's or excess b's
  T → aTb | e // eq # of a's and b's
  A → aA | a // one or more a's
  B → bB | b // one or more b's
- Wrong both because CFLs are NOT closed under complement (we never claimed they were) and L is not the complement of the language named.



A children's book. (Namely, a children's book that Alan Turing read at 10 and liked.)

Q5
2 Points

Which points came up in our discussion of the Church-Turing thesis? Check all that apply.

- [x] TMs can't perform probabilistic computations.
- [x] TMs don't know the time.
- [x] TMs can't communicate with other devices.
- [x] Programs like ChatGPT aren't computing any known, understood function.

Yep, we said all these things and more.

Q6
2 Points

When we write angle brackets in an expression like $\langle M, w \rangle$, what do the angle brackets signify?

It means **an encoding of** (the thing inside the brackets).

Sometimes people say a “natural” encoding.

Said differently: a string that represents, in an unnamed but natural way, whatever is in the angle brackets.

Q7
2 Points

Is the language $\{1^n : n \text{ is prime}\}$ Turing-decidable (recursive)? How do you know?

Yes. You could write a computer program to decide if n (written in unary or binary, it doesn’t matter) is a prime. By the Church-Turing thesis (or the digital-modelling thesis), that is enough: you could translate you program to a TM if need be.