Rust Lab Exercise – Make-up 13/10/2025

No on-line devices allow, only paper book.

Please write the Rust code for:

1. (10 Points) Create a command-line for a word-searching tool which demonstrates the concept of closures and CLI in Rust. To be precise, please design a program that **searches** for words in a **text file** using closures to handle the search logic. The program will contain:

- **CLI Component**:
  - **accept two arguments**: file_name and search_word,
  - read file contents and process them line by line, and
  - display results showing **total matches** and **line numbers**
- **Closure Component**:
  - Create a closure that **captures the search_word**
  - Use this closure to process each line of the file
  - The closure tracks both match count and line numbers

Sample Run of the program:

```
./word_finder example.txt Rust
Found 3 occurrences of "Rust" at lines: 1, 4, 7
```

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2. (10 points) Assume there is a **cheetah** (lives on grassland/savannah, carnivore) and a **horse** (lives on grassland/pasture, herbivore). They want to race each other. Write a Rust program to simulate this race. Each animal has distinct movement speed, habitat, and diet.

4.1) Trait

Create a trait Animal with:

- move_forward(&self) -> f32 — returns forward distance per tick (meters) based on speed.
- get_name(&self) -> &str
- get_habitat(&self) -> &str
- get_diet(&self) -> &str

4.2) Structs

Create two structs:

- Cheetah { speed_mps: f32, habitat: String, diet: String, name: String }
- Horse { speed_mps: f32, habitat: String, diet: String, name: String }

4.3) Implement Trait

- Cheetah::move_forward() returns speed_mps * 1.5
- Horse::move_forward() returns speed_mps * 0.5

4.4) Race Simulation

Write fn race(a: &dyn Animal, b: &dyn Animal, distance: f32) -> &str

Simulate tick-by-tick until one (or both) reaches distance meters. Return the winner's name (or "Tie" if both cross in the same tick).

4.5) Main

Instantiate a cheetah and a horse with speeds, habitats, diets, print each animal's habitat & diet, call race, and print the winner.
