Module 4F Questions:

1. Researchers want to know whether mice on different diets have different probabilities of becoming **hyperglycemic**. They collect data from a small study:

	Hyperglycemic	**Not Hyperglycemic**
Chow	1	5
High-Fat Diet	4	2

   Because the sample size is very small, they decide to use a **Fisher's exact test** instead of a chi-squared test.

A. State the **null and alternative hypotheses** for this test.
B. Explain why a Fisher's exact test is appropriate instead of a chi-squared test.
C. Using the table, set up the **2×2 contingency matrix** you would feed into Fisher's exact test.
D. In words, explain what it would mean to **reject** the null hypothesis in this context.

2. A lab is studying whether a **genetic variant (Pparg-high vs. Pparg-normal)** influences whether mice choose to explore an unfamiliar chamber during a 5-minute test. They record:

	Entered New Chamber	**Did Not Enter**
Pparg-high	3	7
Pparg-normal	8	2

Sample sizes are too small to rely on large-sample approximations, so the team uses a Fisher's exact test.

A. State the **null and alternative hypotheses** about the association between genotype and exploratory behavior.
B. Explain why a Fisher's exact test is preferred in this situation.
C. Interpret what a **significant** result would tell you about Pparg and exploratory behavior.
D. Interpret what a **non-significant** result would mean.

3. Explain the conclusion of the McDonald-Kreitman example that we worked through in lecture. Does it show purifying (negative) selection, Positive selection, or neutral selection and why?