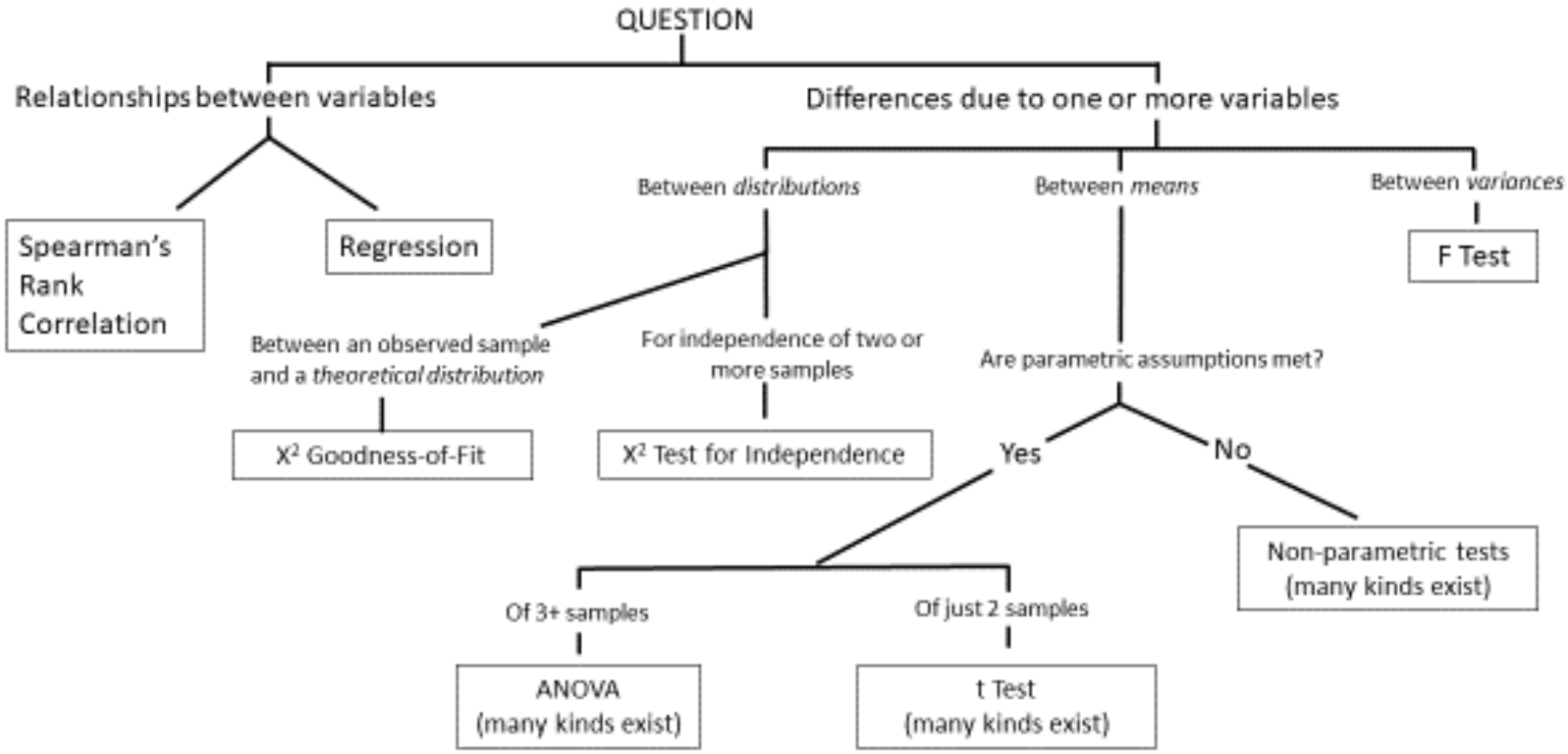
<u>Choosing a Statistical Test:</u> Practice **Name** _____ **Date:** _____

Experiments are virtually incomplete without statistics. For this reason, we must take care to pick the right test based on our hypothesis and question. You will get practice with several scenarios below in linking the question and hypothesis to the appropriate statistical test to run. Additionally, you will see some examples of the appropriate graphs to match the statistics and a chance to interpret the data. *For the purposes of this exercise, assume that the assumptions are met for each test.*

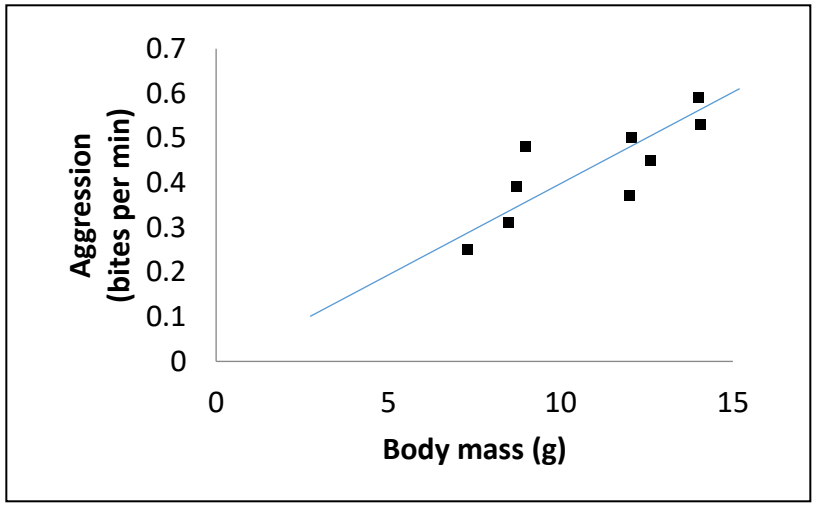


Scenario 1:

You observe a new population of miniature dinosaurs and see differences in individual aggressiveness. Based on your observations, you hypothesize that there is a relationship between size and aggressiveness. You predict the larger the dino, the more aggressive. You decide to determine the body mass of each dino, and then see how many times it bites your roommate per minute.

Here are your data:

Body mass (g)	Aggression (bites per min)
14.07	0.53
14.01	0.59
8.74	0.39
8.5	0.31
12.06	0.5
7.32	0.25
9	0.48
12.61	0.45
12	0.37



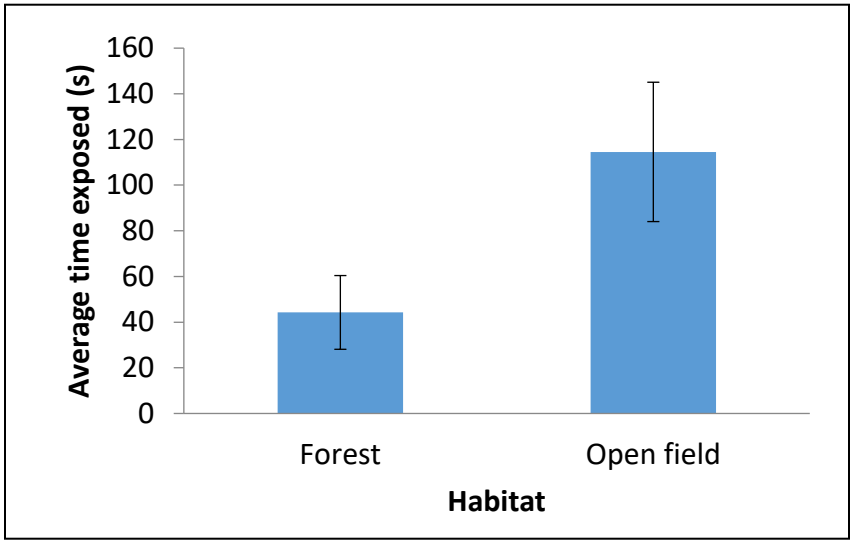
1. **Type of Test:** _____
2. **Use this test when you want to evaluate the** _____
3. **What do you use to tell if these variables are related?** _____

Scenario 2:

You are a scientist evaluating a park on Isla Nublar, and soon after your arrival, you discover deadly dinosaurs all around. To keep everyone alive, you need to determine the safest path to run to the rescue boat: Should you run through a forest or an open field? You hypothesize that you'll be more hidden from (less exposed to) predators when you're in the forest than the open field. You run a pilot test to be sure.

Here are your data:

Time spent exposed (s)	
Forest	**Open field**
45.5	180.0
2.1	250.1
34.3	22.0
6.5	33.3
77.4	112.7
122.0	79.9
22.0	123.9



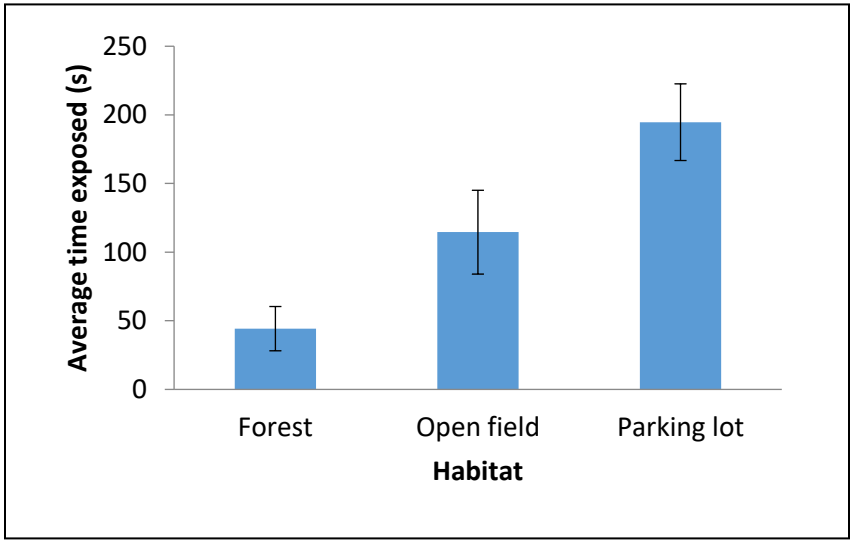
1. **Type of Test:**_____
2. **Use this test when you want to evaluate the** _____
3. **What is your hypothesis? Is it directional?**_____

Scenario 3:

In a strange turn of events, you get tricked into going to a deadly dinosaur amusement park…again. You now find yourself trying to determine the safest path to rescue, and you have 3 options: run through a forest, a field, or a parking lot. From unfortunate previous experience, you hypothesize that you will be least exposed when running through a forest. You want to be sure, however, so you run a pilot test.

Here are your data:

Time Exposed (s)		
Forest	**Open field**	**Parking lot**
45.5	180.0	225.3
2.1	250.1	345.1
34.3	22.0	168.8
6.5	33.3	124.2
77.4	112.7	149.0
122.0	79.9	156.7
22.0	123.9	193.6



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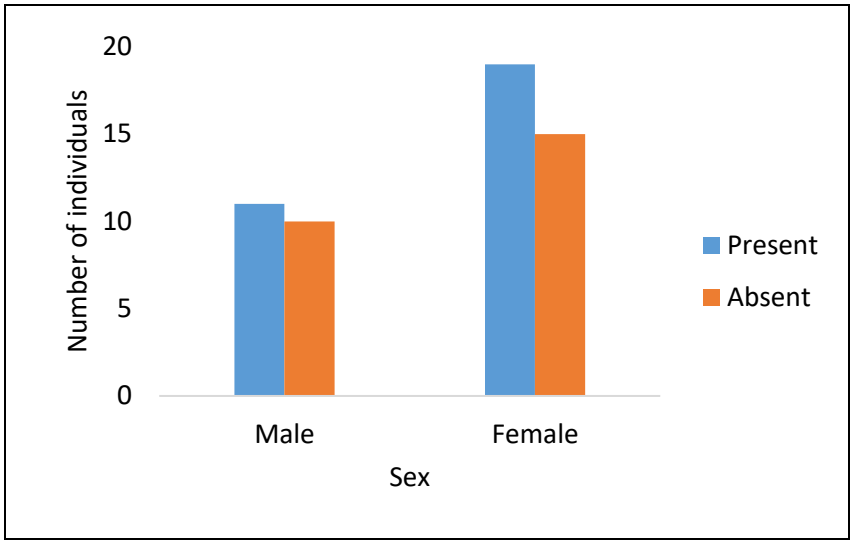
3. **What is your hypothesis?** _____

Scenario 4:

You and your team have successfully escaped a deadly dinosaur island. Upon your arrival home, you are all each offered $1,000,000 to *return* to the island. You are curious as to whether men or women are more likely to take the money and return to the island. So, you make counts of who is present and absent from the boat as it returns to the island, and you compare these numbers statistically.

Here is your data:

	Group	
	Present	**Absent**
Male	11	10
Female	19	15



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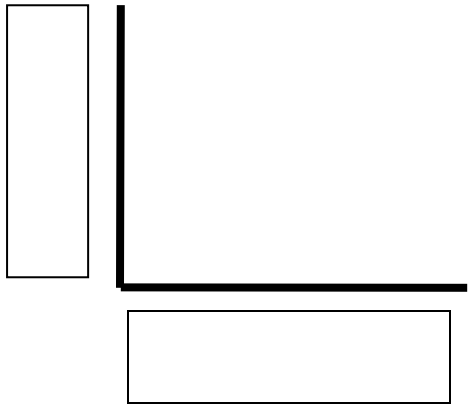
Scenario 5:

You have noticed that the field site for your raptor research is experiencing declines in understory plant species richness, which hurts the herbivores on which your raptors feed. With fewer herbivores on which to feed, your raptors turn to other food sources. You need to solve this problem or you, and your research, are doomed.

You suspect that the declines in species richness are caused by the spread of an invasive plant, Japanese honeysuckle, which outcompetes the native plants; to restore the natives, you consider promoting a rigorous honeysuckle removal program. To evaluate whether honeysuckle density is affecting understory richness, you set up an experiment where you record plant species richness as a function of honeysuckle density (stems per meter^2) throughout the property. Using a random sampling design and geographical information system (GIS) to identify sampling points, you measure understory species richness and honeysuckle density resulting in the following data set:

Honeysuckle Density	Species Richness
24	6
5	12
13	3
31	2
20	10
4	8
13	15
4	20



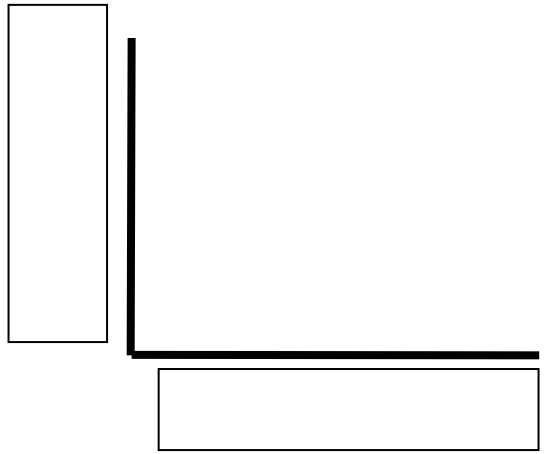
1. **Type of Test:** _____
2. **Use this test when you want to evaluate the** _____
3. **What is your hypothesis? Is it directional?** _____
4. **Generally sketch a graph of the data by placing the correct variables on each axis. Don't forget any units!**

5.

Scenario 6:

While investigating raptor habitat, you notice that running raptors tend to rip up plants low to the ground. This poses a problem, as raptors might be removing the plants needed by the herbivores they eat. So, you decide to evaluate the impact of raptor hunts on tree sapling growth. To accomplish this, you set up seven exclusion areas ("No Predator") using raptor-proof fencing (*where was before?!!?*) and seven non-exclusion areas of equal size with no fencing ("Predator"). After two years you compare the mean tree sapling height (cm) from the "No Predator" and "Predator" treatments.

No Predator	Predator
203.8	45.88
240.3	62.4
221.2	44.0
300.5	47.56
233.3	64.01
207.1	29.33
189.3	55.45



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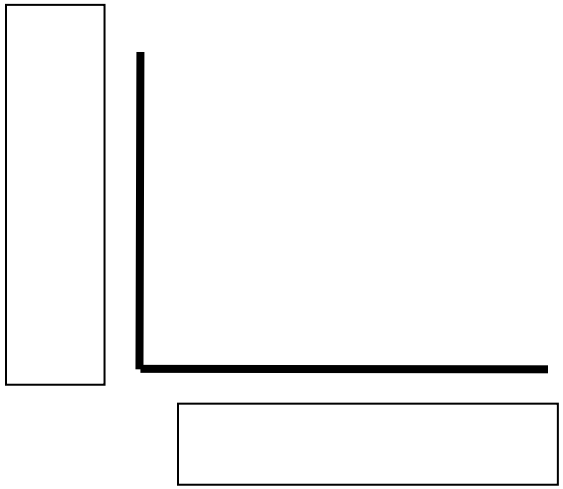
Scenario 7:

A portion of your raptor field site is also part of a Jurassic prairie restoration project. In this project, paleobotanists are trying to discover which management practices promote diversity in Jurassic prarie ecosystems. Some areas of this field site are managed by controlled burns, grazing by tiny chicken-like dinosaurs, or both burning and grazing. To evaluate grass diversity on your field site, you determine the total number of grass species present within areas experiencing no intervention, burns, grazing, and both controlled burn and grazing, using eight randomly selected survey sites per area.

Management Strategy			
No Intervention	**Burns**	**Grazing**	**Both Burns and Grazing**
2	10	6	10
1	7	8	12
3	5	7	11
5	7	8	8
4	11	10	10
2	8	8	12
2	7	9	13
3	10	6	13



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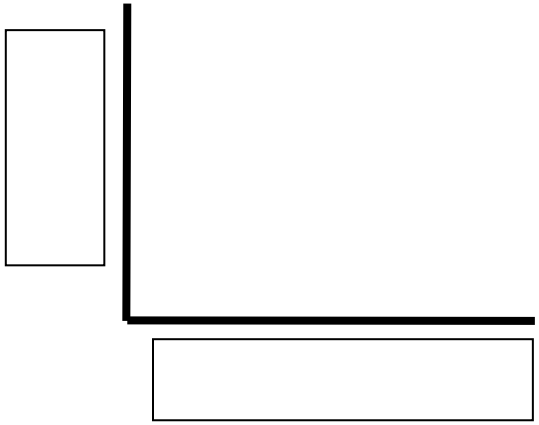
Scenario 8:

Habitat use of wildlife is often related directly, at least in part, to diet choice. You are interested in the food preferences of mostly-herbivorous dinosaurs on your field site, in hopes of providing enough 'good' food to keep their populations large, and by proxy, keep the raptors well-fed (and away from seeking humans). You calculate the frequency of occurrence of five major foods in their diet based on fossilized fecal remains, and then use this data to determine whether these dinos show a preference for a specific food that could be managed to either increase or control populations.

Food Item	Frequency of Occurrence
Tree Saplings	52
Grasses	35
Bush fruits	7
Mature tree bark	4
Insects	2
Total	100



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