Placeholder page for
Front-Cover

Placeholder page for
Inside-Cover

Unit 1

(and room for notes!)

Expressions, Values, and Errors

For each expression, if it produces an error when evaluated,
write what kind of error occurs:

- For division by zero errors, write "division by 0".
- For errors where the operator is given the wrong type, write "wrong type".
- Otherwise, write what the expression evaluates to.

Expression	Value, or Error?
`8 - 5.3`	
`2 / 0`	
`"Three" * 2`	
`(3 + 5) * 3`	
`1.5 * "6"`	
`(2 / (3 - (2 + 1)))`	

Identifiers and Expressions

Imagine the program below has been written in your definitions window:

```
x = (3 * 2) - 2
y = x * 1.5
```

For each expression, if it produces an error when evaluated, write what kind of error occurs:

- For division by zero errors, write "division by 0".
- For errors where a variable hasn't been defined, write "unbound id"
- Otherwise, write what the expression evaluates to.

Expression	Value, or Error?
`y`	
`x - 3`	
`(y - 1) * z`	
`(x + y) / 2`	
`x + y`	

Unit 2

Animals

Animal	Number-of-legs
"Human"	2
"Ant"	6
"Spider"	8
"Bear"	4
"Snake"	0

1. How many rows does this table have? _____

2. How many columns does this table have? _____

3. What are the names of the columns? _____

4. For the row with value "Human" in the **Animal** column, what is the value in the **Number-of-legs** column? _____

5. Circle the header row of this table

Presidents and Nutrition

Answer the following questions about the `presidents` and `nutrition` tables, using your Unit-2 Pyret program:

1. How many columns does the `presidents` table have? _____

2. What are the names of the columns? _____

3. How many rows does the `presidents` table have? _____

4. Is the `party` column quantitative or categorical? _____

5. Is the data in the `home-state` column categorical? _____

6. If so, how many categories are there? _____

7. What is the home state of Millard Fillmore? _____

8. Who was the first president from the Federalist party? _____

9. How many columns does the nutrition table have? _____

10. How many rows does the nutrition table have? _____

11. How many grams of cholesterol does the Hamburger have? _____

12. Which food has the largest serving size? _____

13. Is the data in the `calories` column quantitative? If so, why?

_____

Unit 3

Mean, Median, Mode Practice

Using pencil & paper, calculate the 3 numbers that measure the center of each list. If a list contains more than one mode, write the number with the smallest value.

These lists are bound to variables a, b, c, d, e in the Unit 3 template file, so you can check your answers with Pyret.

List	Mean	Median	Mode
a = [list: 1, 1, 4]			
b = [list: 3, 4, 5]			
c = [list: 3, 3, 4, 6]			
d = [list: -1, 0.5, 2, 0.5, 2, 6]			
e = [list: 2, 11, 7, 4]			

Measuring Center in Pyret

1. What is the mode of the `calories-list`? _____

2. What is the mean amount of `sodium` for menu items? _____

3. What is the median GDP for all the countries in `countries`? _____

4. What is the median of `life-expectancy-list`? _____

Imagine the following code is in your definitions window:

```
mystery-list = [list: 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

5. What is the median of this mystery-list? _____

Now imagine these lists (which contain the same elements as `mystery-list`) are in your definitions window:

```
mystery1 = [list: 1, 4, 7]
mystery2 = [list: 2, 3, 8]
mystery3 = [list: 5, 6, 9]
```

6. What is the median of `mystery1`? _____

7. What is the median of `mystery2`? _____

8. What is the median of `mystery3`? _____

9. What is the median of a list containing these 3 medians? _____

10. Is this different from the median of `mystery-list`? _____

Unit 4

Reading Charts

1. Which menu item has the most sodium? _____
2. Which menu item has the least sodium? _____
3. Do french fries have more sodium than hamburgers? _____
4. Which country has the largest GDP? _____
5. What percent of the total world GDP is from China? _____

Frequency Bar Chart

First	Last	Eye-Color
"John"	"Doe"	"Green"
"Jane"	"Smith"	"Brown"
"Javon"	"Jackson"	"Brown"
"Angela"	"Enriquez"	"Hazel"
"Jack"	"Thompson"	"Blue"
"Dominique"	"Rodriguez"	"Hazel"
"Sammy"	"Carter"	"Blue"
"Andrea"	"Garcia"	"Brown"

1. How many students have Brown eyes? _____
2. How many students have Green eyes? _____
3. How many students have Hazel eyes? _____
4. How many students have Blue eyes? _____
5. Above the "Blue" label on this bar chart, add a bar with height that corresponds to the number of students with Blue eyes.

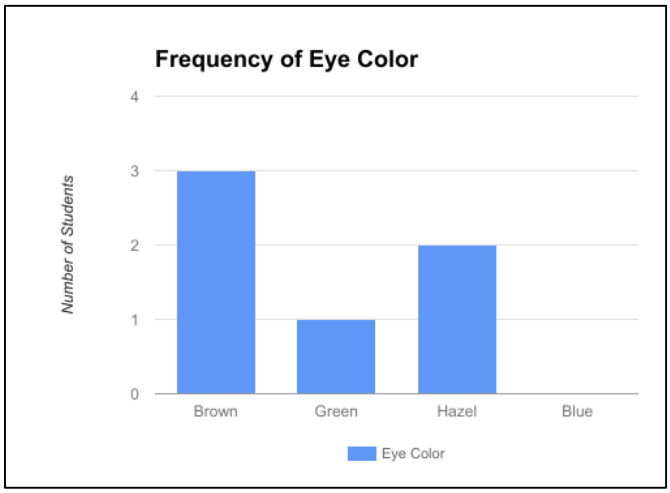
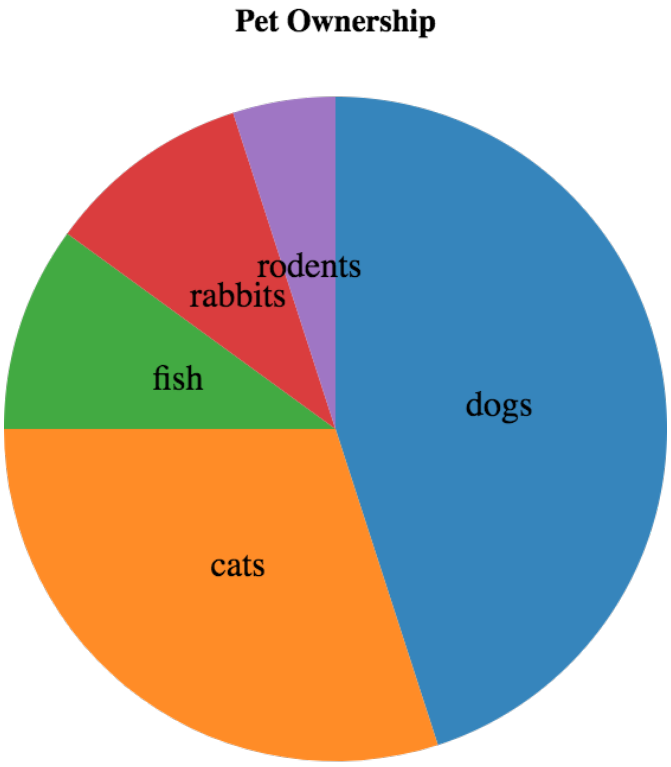
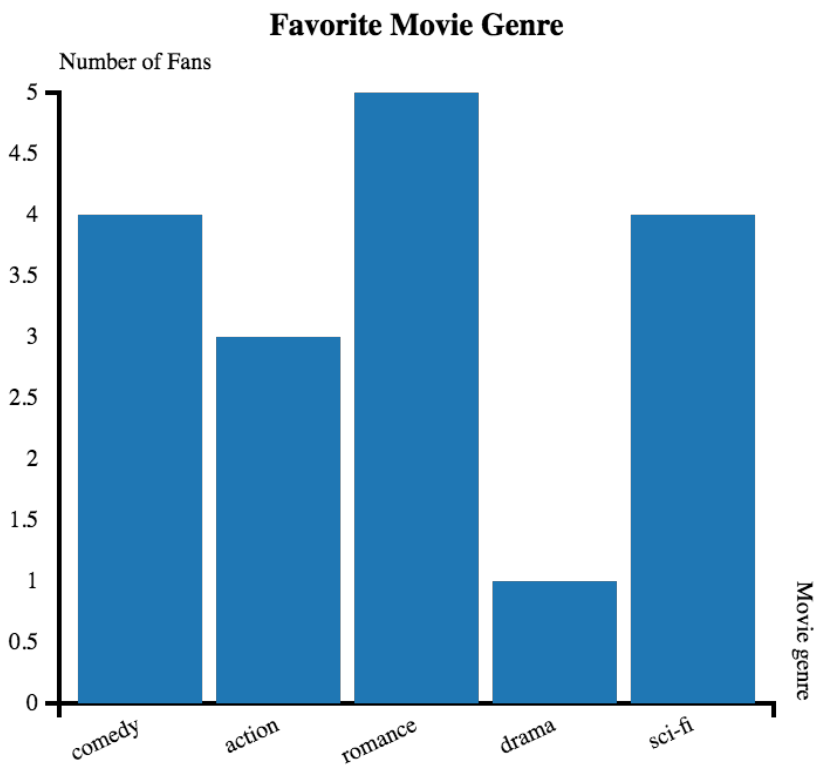


Chart Practice

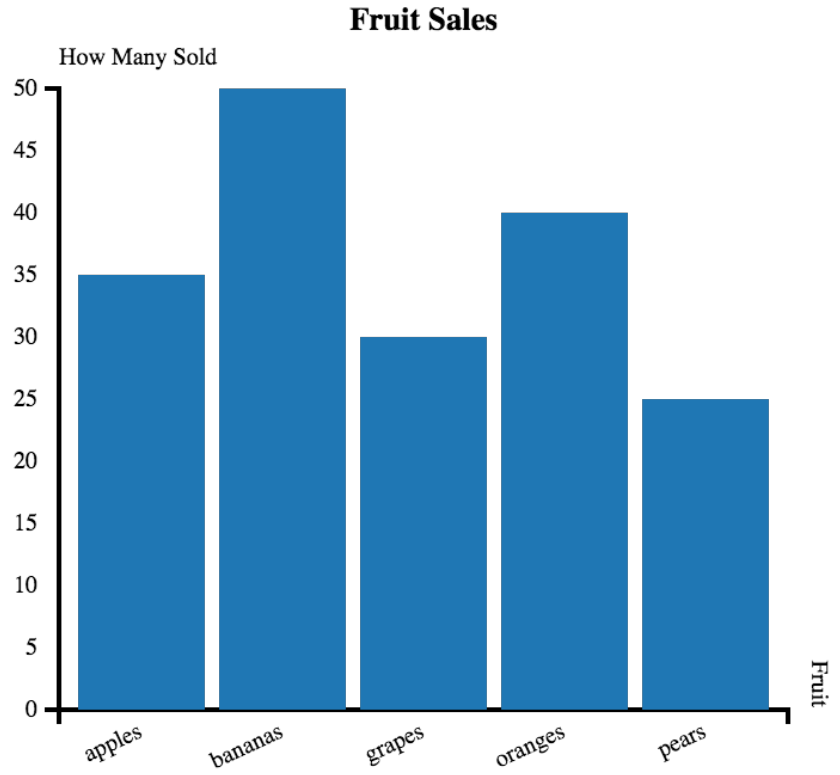


1. Is this a pie chart, or a bar chart? _____
2. Which pet is the most popular? _____
3. Which pet is the least popular? _____
4. Which are more popular, fish or rodents? _____



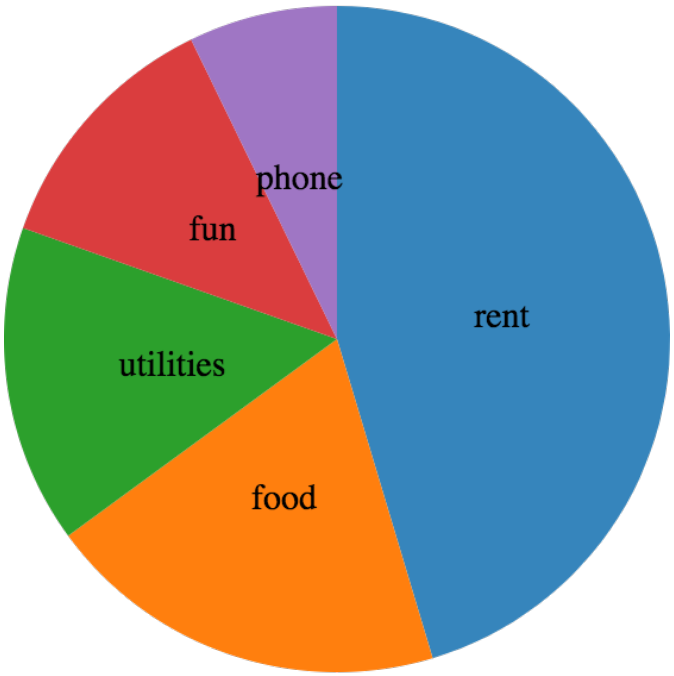
1. Is this a bar chart or a pie chart? _____
2. What genre is most popular? _____
3. What are the labels of this chart? _____
4. What are the values of this chart? _____
5. Is this a frequency bar chart? _____

More Chart Practice



1. Are apples more popular than grapes? _____
2. How many categories of fruit are there? _____
3. How many pears were sold? _____
4. What fruit is least popular? _____

Monthly Budget



1. Which expense needs the least amount of money? _____

2. Which expense takes up almost half of the budget? _____

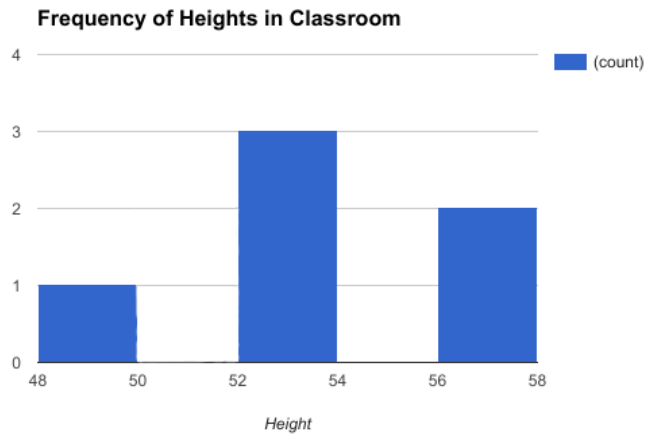
3. Suppose a person has a $2000 monthly budget, and they spend 15% on food. How many dollars is spent on food in a single month? _____

Unit 5

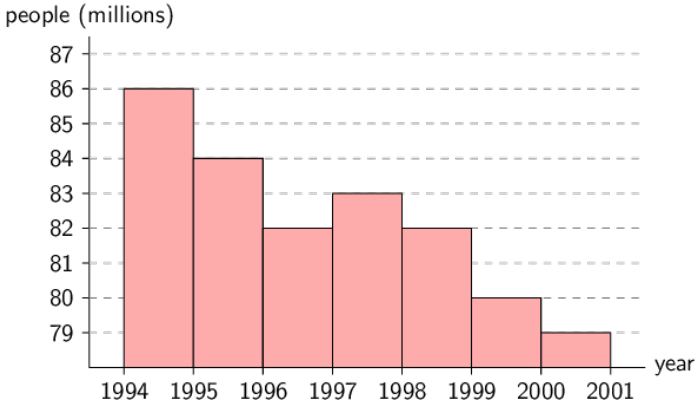
Introducing Histograms

First	Last	Height
"John"	"Doe"	52.0
"Jane"	"Smith"	49.1
"Javon"	"Jackson"	57.7
"Angela"	"Enriquez"	52.5
"Jack"	"Thompson"	53.0
"Dominique"	"Rodriguez"	51.1
"Sammy"	"Carter"	56.2
"Andrea"	"Garcia"	50.8

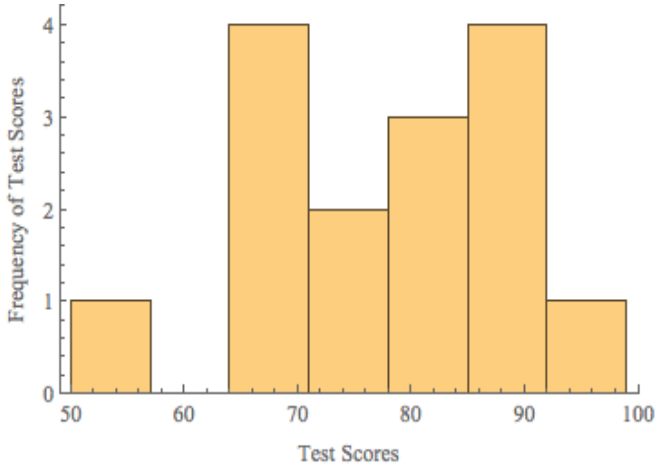
1. How many students are between 48 and 50 inches tall? _____
2. How many students are between 50 and 52 inches tall? _____
3. How many students are between 52 and 54 inches tall? _____
4. How many students are between 54 and 56 inches tall? _____
5. How many students are between 56 and 58 inches tall? _____
6. Add a bar to this histogram for students who are between 50 and 52 inches tall.



Histogram Practice



1. How many people were born between 1996 and 1997? _____
2. On what year were the most number of people born? _____
3. How many bins does this histogram have? _____
4. Were more people born in 1994 or 1995? _____



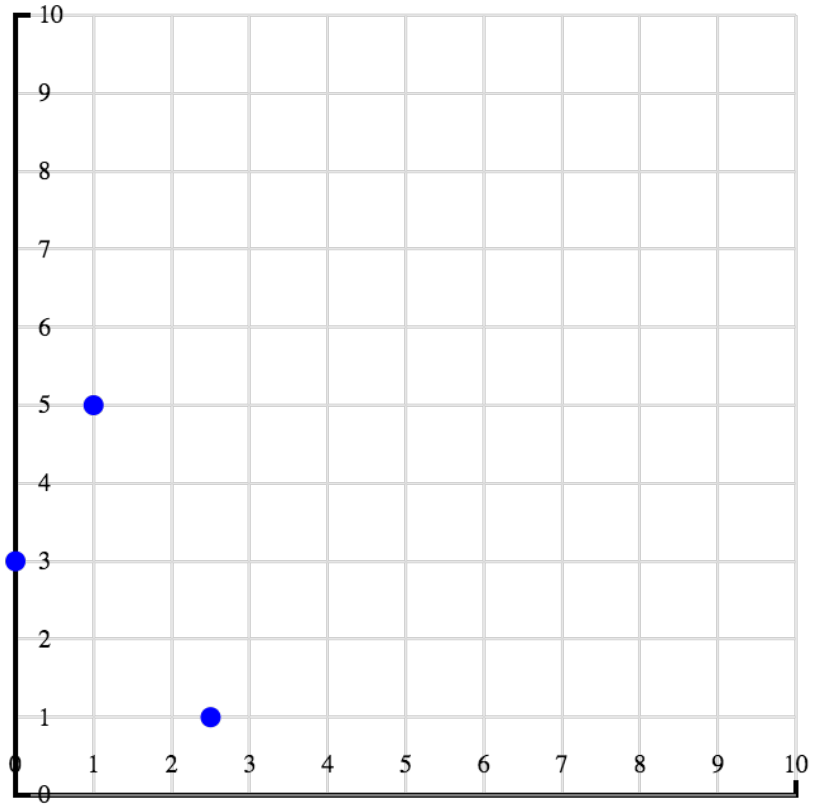
1. How many bins does this histogram have? _____
2. What is (are) the bins with the highest frequency of scores? _____
3. How many students scored between 85 and 92? _____

Unit 6

Creating a Scatter Plot

For each row in the following table, add a dot to the scatter plot. The first 3 rows have been completed for you. Use the values from the left column along the horizontal axis, and values from the right column along the vertical axis.

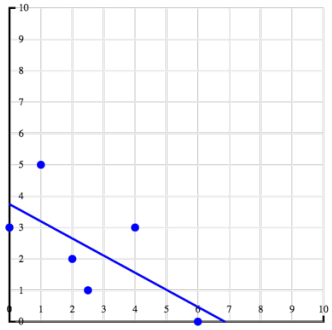
0	3
1	5
2.5	1
2	2
6	0
4	3

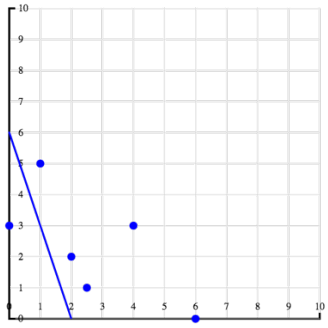


Grading Predictor Functions

Below are the scatterplots for 4 data sets, with two different predictors shown for each set. For each data set, **circle the plot with the predictor function that fits better**, and **give it a grade between 0 (worst possible fit) and 1 (best possible fit).**

1

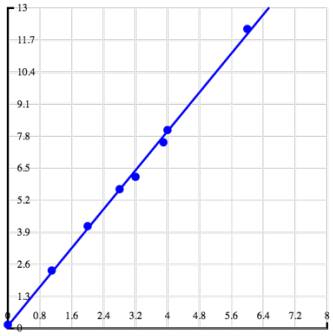


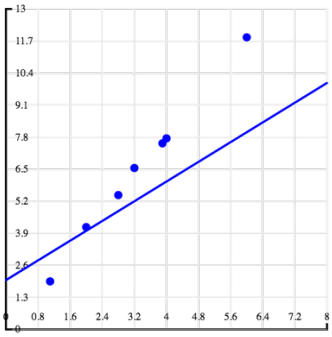


Grade for best predictor:

_____

2

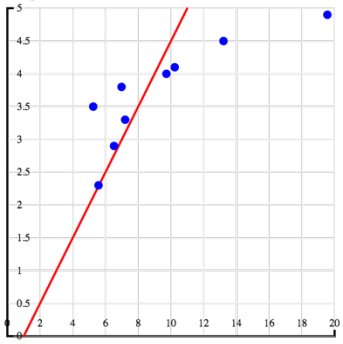


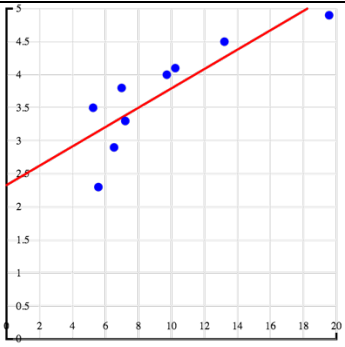


Grade for best predictor:

_____

3

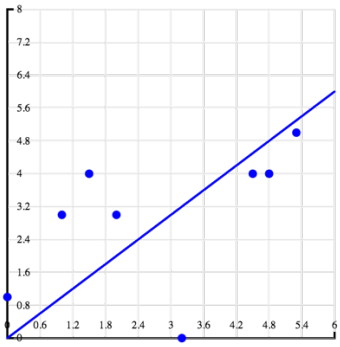


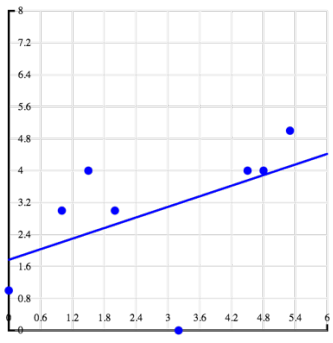


Grade for best predictor:

_____

4





Grade for best predictor:

_____

Unit 7

Select Practice

Below is a table bound to the variable name `animals`

name	legs	eyes	lifespan
"Human"	2	2	71
"Garden Ant"	6	2	8
"Spider"	8	8	2.5
"Bear"	4	2	10

1. Write the code to select the `name` and `eyes` columns from `animals`

---

2. Write the code to select the `name` and `legs` columns from `animals`

---

3. Write the code to select the `eyes` and `lifespan` columns from `animals`

---

4. Draw the table produced by this code (don't forget the header row!):

```
select lifespan, name from animals end
```


(continued on next page →)

5. What code produces the table shown here?

eyes
2
2
8
2

6. *Challenge:* Draw the table produced by this code:

```
mystery = select name, legs from animals end

select legs from mystery end
```


Order Practice

Below is a table bound to the variable name `animals`

name	legs	lifespan
"Human"	2	71
"Garden Ant"	6	8
"Spider"	8	2.5
"Bear"	4	10

Draw the animals table ordered by the `legs` column in descending order:

name	legs	lifespan

Draw the animals table ordered by the `lifespan` column in ascending order:

name	legs	lifespan

Questions About Rows

1. Circle or highlight all of the rows with animals that have 4 legs or less.

name	legs	eyes	class
"Human"	2	2	"Mammal"
"Garden Ant"	6	2	"Invertebrate"
"Spider"	8	8	"Invertebrate"
"Bear"	4	2	"Mammal"

2. Which animal(s) with 4 legs or less have exactly 2 eyes?

---

3. Circle or highlight all of the rows with animals that are mammals.

name	legs	eyes	class
"Human"	2	2	"Mammal"
"Garden Ant"	6	2	"Invertebrate"
"Spider"	8	8	"Invertebrate"
"Bear"	4	2	"Mammal"

4. What animal(s) that are mammals have exactly 4 legs?

Unit 8

Booleans and Comparison

The following code is in your definitions window:

```
legs = 2
eyes = 2
class = "Mammal"
```

What do each of these boolean expressions evaluate to? You may only use the Interactions window to check your answers after you have permission from the teacher.

Expression	Value
`legs <= 4`	
`eyes == 2`	
`legs <> 4`	
`eyes <> 5 - 3`	
`legs == eyes`	

When you finish the first table try these challenge questions:

Expression	Value
`class == "Mammal"`	
`class == "Invertebrate"`	
`class <> "mammal"`	

Sieve Practice

1. *What column(s) help decide which countries to keep?* _____

2. *What boolean expression will decide to keep a country?* _____

```
countries-sieved = sieve countries using _____:
                                          Columns used in expression

      _____
      Expression to ask true/false question
end
```

3. *What column will the table be ordered by?* _____

4. *Ascending or descending order?* _____

```
countries-ordered = order countries-sieved:

      _____                  _____
      Column to order by     ascending/descending

end
```

5. *Which columns do we want to select?* _____

```
countries-sieved =
     select _____ from countries-ordered end
            Columns to select
```

Unit 9

Extending Tables

Below is a table named containing the number of points scored by different NBA players in their first 3 games of a season. For each row, fill in the value of the **total-points** column, by adding the **game-1, game-2, game-3** columns together.

player	game-1	game-2	game-3	total
"Lebron James"	30	28	36	
"Steph Curry"	26	32	29	
"Kyrie Irving"	21	24	27	
"John Wall"	27	30	25	
"Isaiah Thomas"	25	22	24	

6. Which player has scored the most points so far? _____

Below is a table named **stores** containing the prices of packs of socks for several different stores. Each store sells different size packs, for different prices. For each row, fill in the values of the **price-per-sock**.

name	price	socks	price-per-sock
"Super Store"	2.50	4	
"Clothes Galore"	5.40	4	
"Bargain Mart"	4.50	6	
"Fashion Statement"	15.00	12	
"Sock Emporium"	7.00	10	

7. Which store has the best deal on socks? _____

Countries Table Plan

Do I need to add a column?

_____-extended_ = **extend** _____ **using** _____:

_____ : _____

end

Do I need to get rid of any rows?

_____-sieved_ = **sieve** _____ **using** _____:

_____

end

Do the rows need to be in some order?

_____-ordered_ = **order** _____:

_____

end

Are any of the columns unnecessary?

_____-selected_ =

select _____ **from** _____ **end**

Nutrition Table Plan Practice

Your uncle is a bodybuilder, and wants to a healthy menu item. Healthy food is food with less than 80 grams of cholesterol. What are the top 5 healthy menu items with the highest protein per gram?

Do I need to add a column?

_____-extended_ = **extend** _____ **using** _____:

_____ : _____

end

Do I need to get rid of any rows?

_____-sieved_ = **sieve** _____ **using** _____:

_____

end

Do the rows need to be in some order?

_____-ordered_ = **order** _____:

_____

end

Are any of the columns unnecessary?

_____-selected_ =

select _____ **from** _____ **end**

Presidents Table Plan Practice

How many years was each Democratic president in office? Make a histogram showing how many democratic presidents serve between 0 - 4 years, or 4 - 8 years.

Do I need to add a column?

_____-extended_ = **extend** _____ **using** _____:

_____ : _____

end

Do I need to get rid of any rows?

_____-sieved_ = **sieve** _____ **using** _____:

_____

end

Do the rows need to be in some order?

_____-ordered_ = **order** _____:

_____

end

Are any of the columns unnecessary?

_____-selected_ =

select _____ **from** _____ **end**

Rainfall Table Plan Practice

Given a table recording how much rain has fallen in a garden, make a scatter plot of how much rain fell in the first 99 days. Is the amount of rain per day increasing or decreasing? What's the mean rainfall of the first 99 days?

Do I need to add a column?

_____-extended_ = **extend** _____ **using** _____:

_____ : _____

end

Do I need to get rid of any rows?

_____-sieved_ = **sieve** _____ **using** _____:

_____

end

Do the rows need to be in some order?

_____-ordered_ = **order** _____:

_____

end

Are any of the columns unnecessary?

_____-selected_ =

select _____ **from** _____ **end**

Countries Table Plan Practice

Make a histogram of per-capita GDP for countries with universal health care. Do most of these countries have a per-capita GDP that is higher than the average per-capita GDP of all countries?

Do I need to add a column?

_____-extended_ = **extend** _____ **using** _____:

_____ : _____

end

Do I need to get rid of any rows?

_____-sieved_ = **sieve** _____ **using** _____:

_____

end

Do the rows need to be in some order?

_____-ordered_ = **order** _____:

_____

end

Are any of the columns unnecessary?

_____-selected_ =

select _____ **from** _____ **end**

Table Plan

Do I need to add a column?

_____ = **extend** _____ **using** _____:

    _____ : _____

end

Do I need to get rid of any rows?

_____ = **sieve** _____ **using** _____:

    _____

end

Do the rows need to be in some order?

_____ = **order** _____:

    _____

end

Are any of the columns unnecessary?

_____ =

    select _____ **from** _____ **end**

Table Plan

Do I need to add a column?

_____ = **extend** _____ **using** _____:

    _____ : _____

end

Do I need to get rid of any rows?

_____ = **sieve** _____ **using** _____:

    _____

end

Do the rows need to be in some order?

_____ = **order** _____:

    _____

end

Are any of the columns unnecessary?

_____ =

    select _____ **from** _____ **end**

Table Plan

Do I need to add a column?

_____ = **extend** _____ **using** _____:

    _____ : _____

end

Do I need to get rid of any rows?

_____ = **sieve** _____ **using** _____:

    _____

end

Do the rows need to be in some order?

_____ = **order** _____:

    _____

end

Are any of the columns unnecessary?

_____ =

    select _____ **from** _____ **end**

Contracts

Name	Domain	Range	Example
num-max			num-max(-1, 3)
string-length			string-length("pyret")
string-repeat	String Number	String	