Math 243

Graphs for Two quantitative variables – Inv. 5.6

Announcements

1. Last quiz on Friday

2. HW 9 due at Final Exam

3. Revised Project due on Nov. 26th.

4. Extra credit opportunities:

- 40% of missed points on **Exam 1 or 2** for complete, correct solutions by Final Exam
- +10 points on your **Final Exam** if *everyone* fills out the online course evals by Friday

Class Objectives

- Learning appropriate methods for **collecting**, **analyzing**, and **interpreting** numerical information

- Gaining a basic understanding of the field of statistics (i.e., **definitions** and **theorems**)

- Learning to **apply** course material to answer your own research question or evaluate existing statistical evidence

Course Feedback

Your course feedback is very valuable to me in improving the course for future students.

I've used previous feedback to:

- Shorten homework assignments
- Create detailed lecture slides to supplement workbook
- Choose a course grading scheme (1 project, 2 midterms)
- Write a few detailed handouts to supplement the workbook
- Provide sets of completely worked out examples to review before each quiz

Please help me to continue to improve the course by giving comments in the online course evals.

Chapter 5: two quantitative variables

Descriptive statistics:

- **Graph** = scatterplot
- **Numerical summaries** =

  correlation coefficient, R^2, or regression slope

Inferential Methods:

Read the rest of Chapter 5 or take Math 362

Inv. 5.6: Cat Jumping

Researchers were interested in the jumping ability of domestic cats. They recorded the take-off velocity for 18 cats along with several characteristics:

- Takeoff velocity (cm/sec)
- Body mass (grams)
- Hind limb length (cm)
- Muscle mass (grams)
- Sex

Inv. 5.6: Cat Jumping

	ID	Sex	bodymass	hindlimb	musclemass	percentbodyfat	velocity
1	A	F	3640	29.10	51.15	29	334.5
2	B	F	2670	28.55	46.05	17	387.3
3	C	M	5600	31.74	95.90	31	410.8
4	D	F	4130	26.90	55.65	39	318.6
5	E	F	3020	26.11	57.20	15	368.7
6	F	F	2660	26.69	48.67	11	358.8
7	G	F	3240	26.74	64.55	21	344.6
8	H	M	5140	27.71	78.80	35	324.6
9	I	F	3690	25.47	54.60	33	301.4
10	J	F	3620	28.18	55.50	15	331.8
11	K	F	5310	28.45	68.80	42	312.6
12	L	M	5560	28.65	79.80	37	316.8
13	M	M	3970	29.82	69.40	20	375.6
14	N	F	3770	26.66	60.25	26	372.4
15	O	F	5100	27.84	60.70	41	314.3
16	P	F	2950	27.89	55.65	25	367.5

Response Variable: take-off velocity

1 quantitative variable…

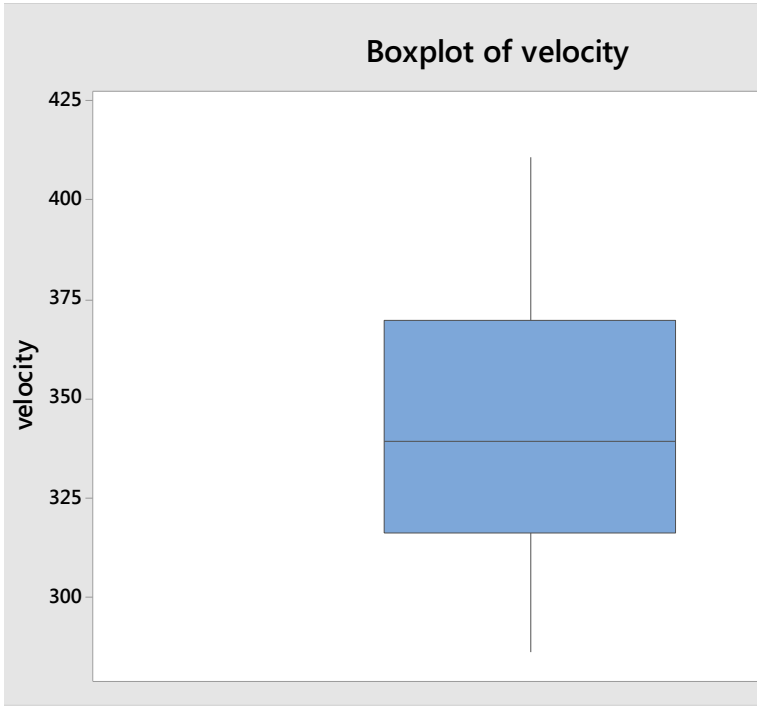
- what numerical summaries would you like to see?

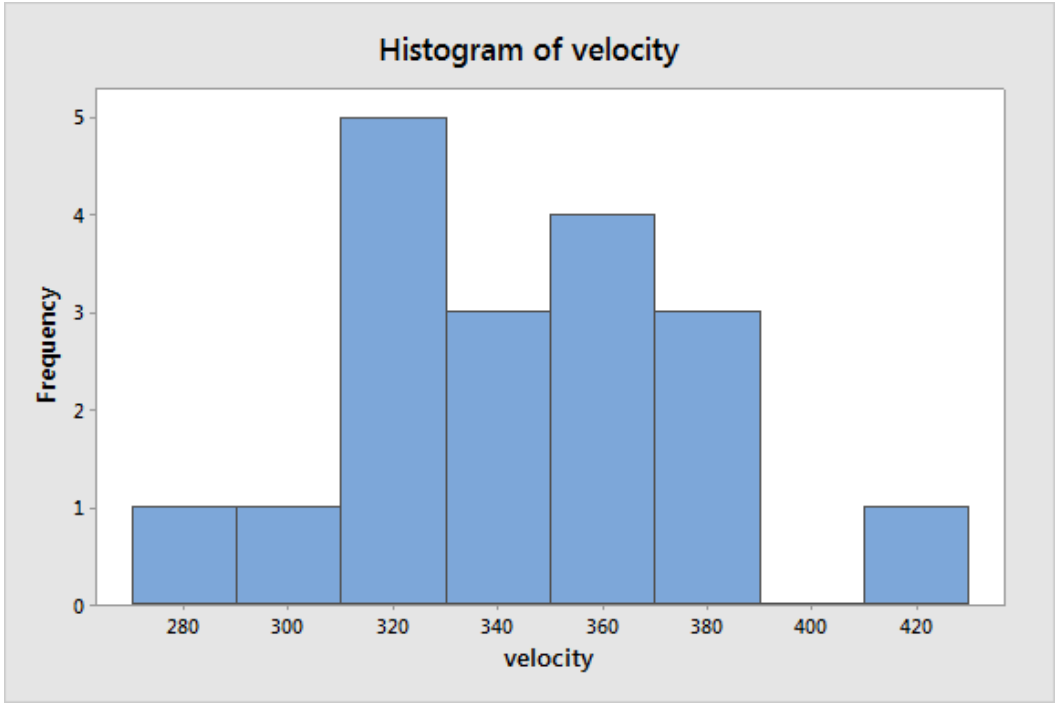
- what type of graph?

Take-off Velocity

Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
velocity	18	0	343.28	7.80	33.08	286.30	316.18	339.55	369.63	410.80





Describe the distribution of take-off velocities

- Center?
- Spread?
- Shape
- Unusual observations?

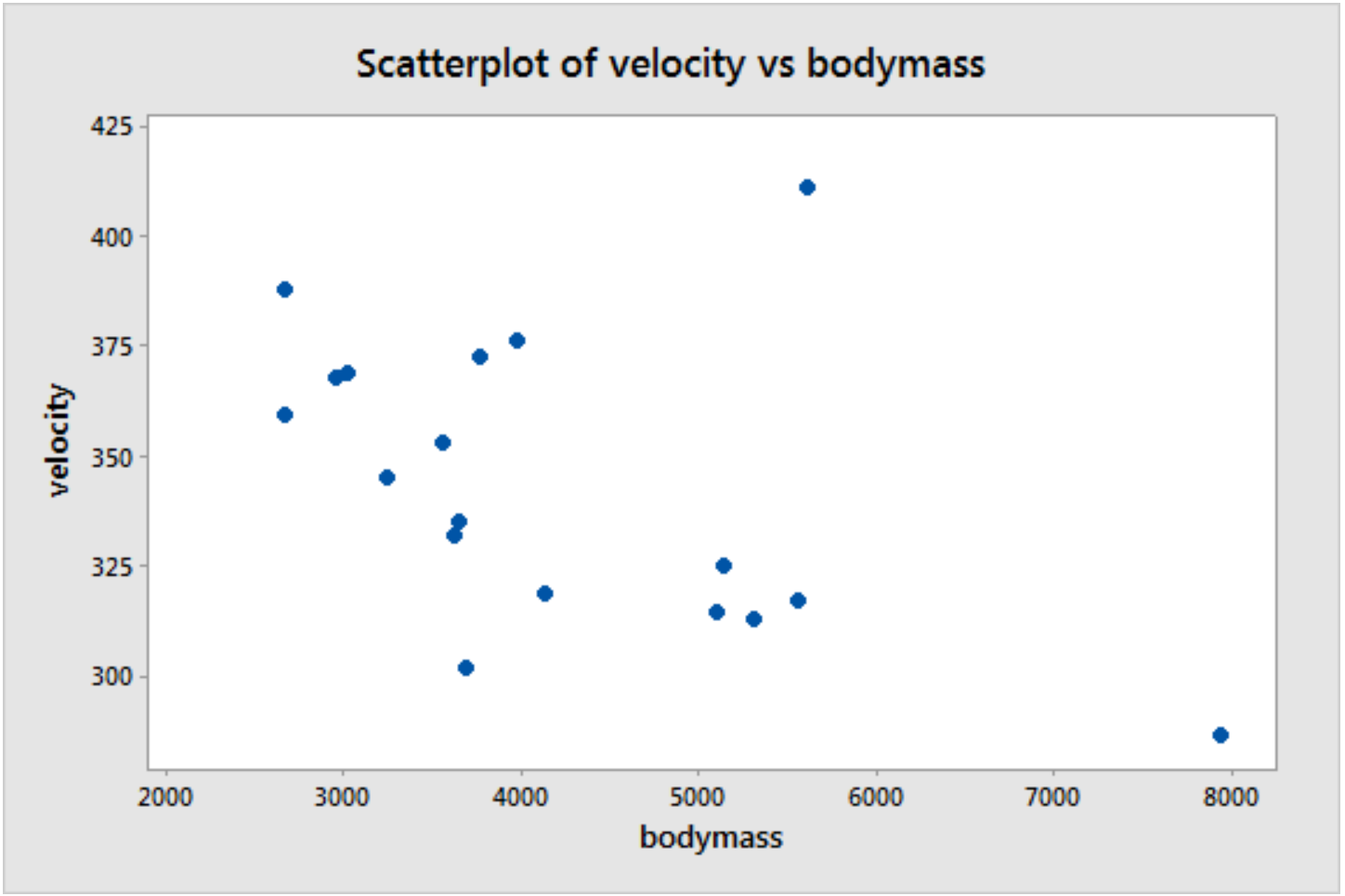
Inv. 5.6, part c.

If you were to randomly select a cat, what's your best guess for it's takeoff velocity?

Inv. 5.6, part d

- Do you think there will be a relationship between a cat's takeoff velocity and its body mass?

A scatterplot shows the relationship between two quantitative variables



Inv. 5.6, part (e)

- Describe the relationship between take-off velocity and body mass as seen in the scatterplot.

Direction:

Linearity:

Strength:

Inv. 5.6, part (f)

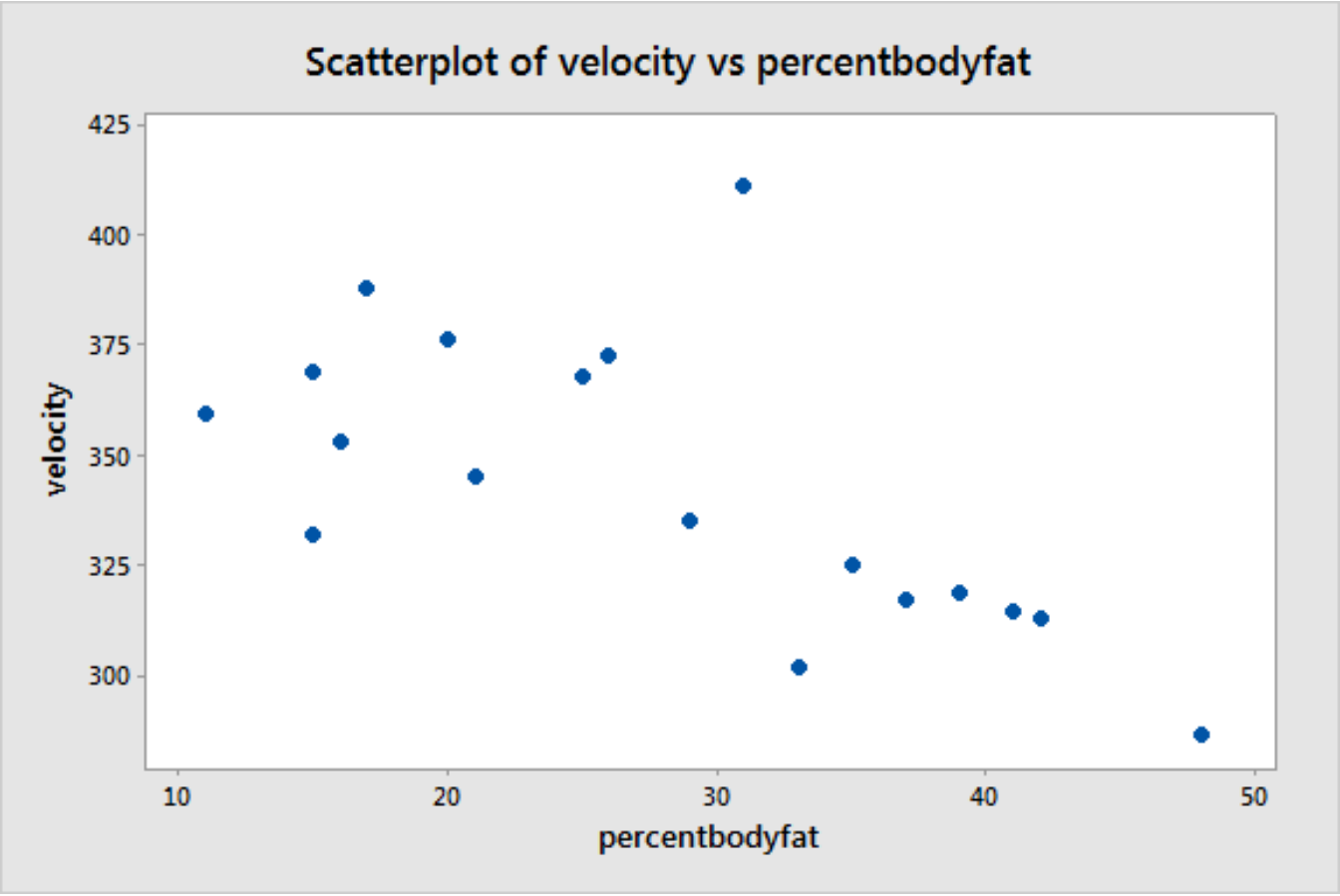
- Do any of the cats appear to be outliers, that is, they do not match the pattern of the majority of the cats?

Inv. 5.6, part(g) Describe the relationship

Direction?

Linearity?

Strength?



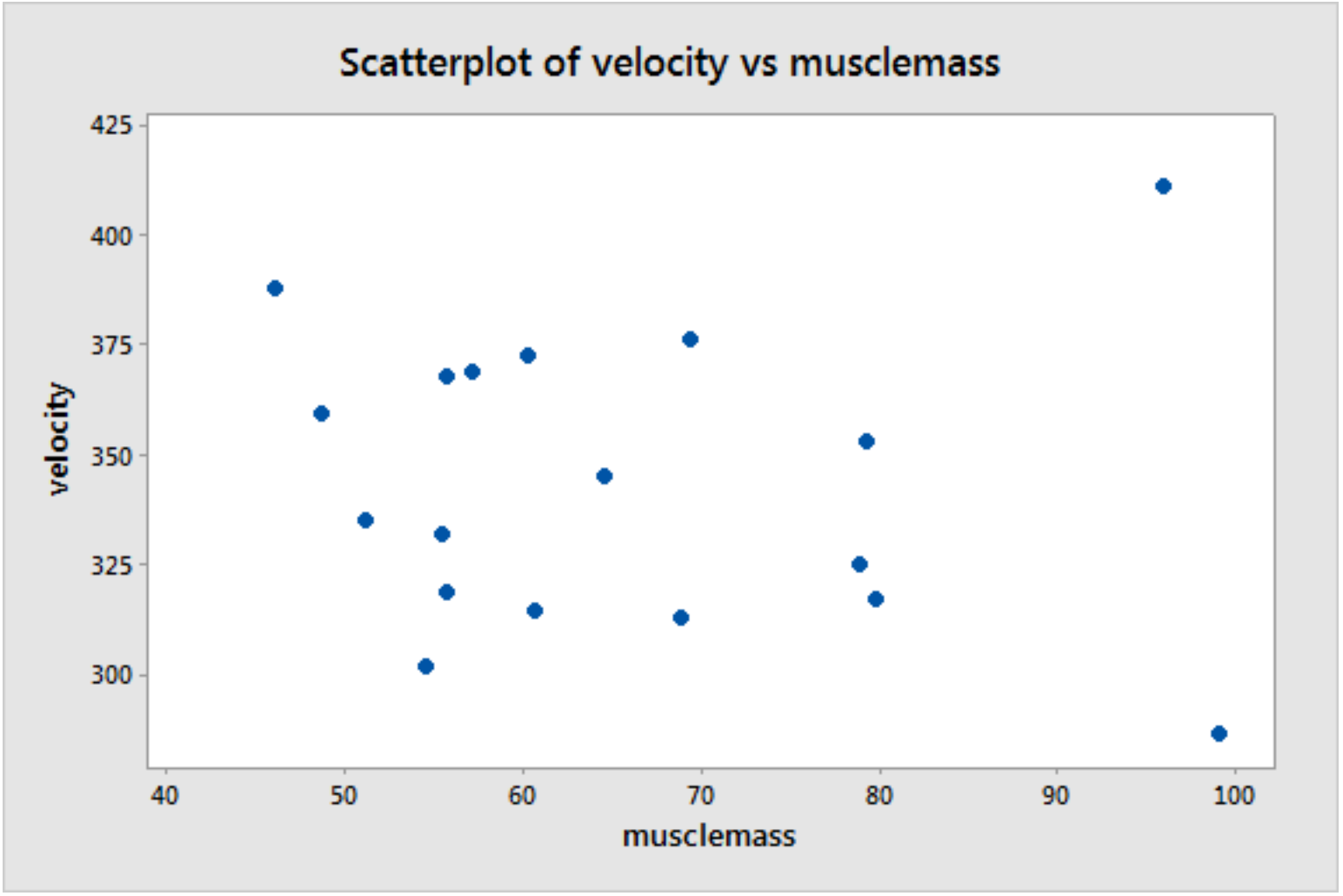
Inv. 5.6, part (h)

What do you expect to see for

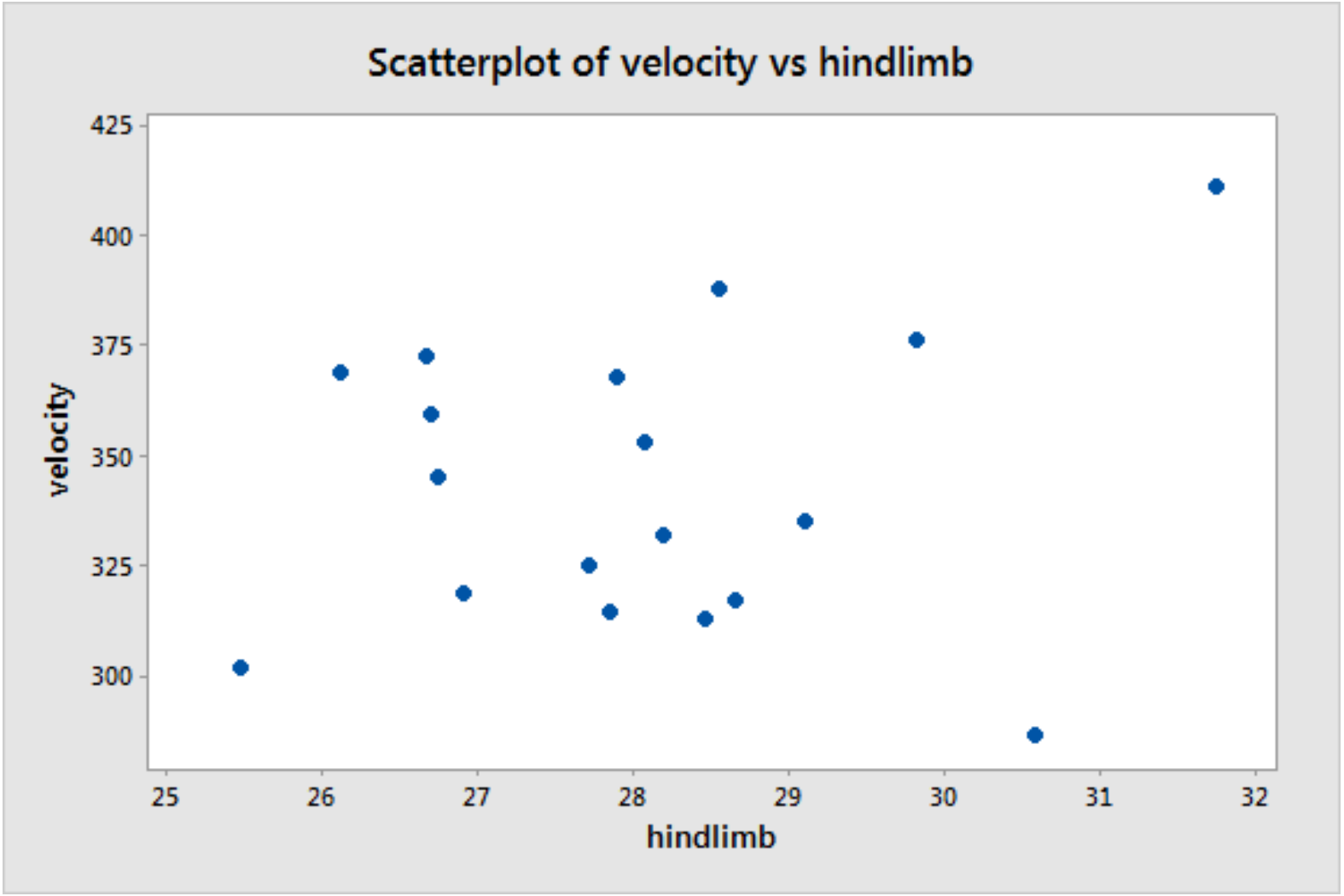
- *velocity vs. hind limb length?*

- *velocity vs. muscle mass?*

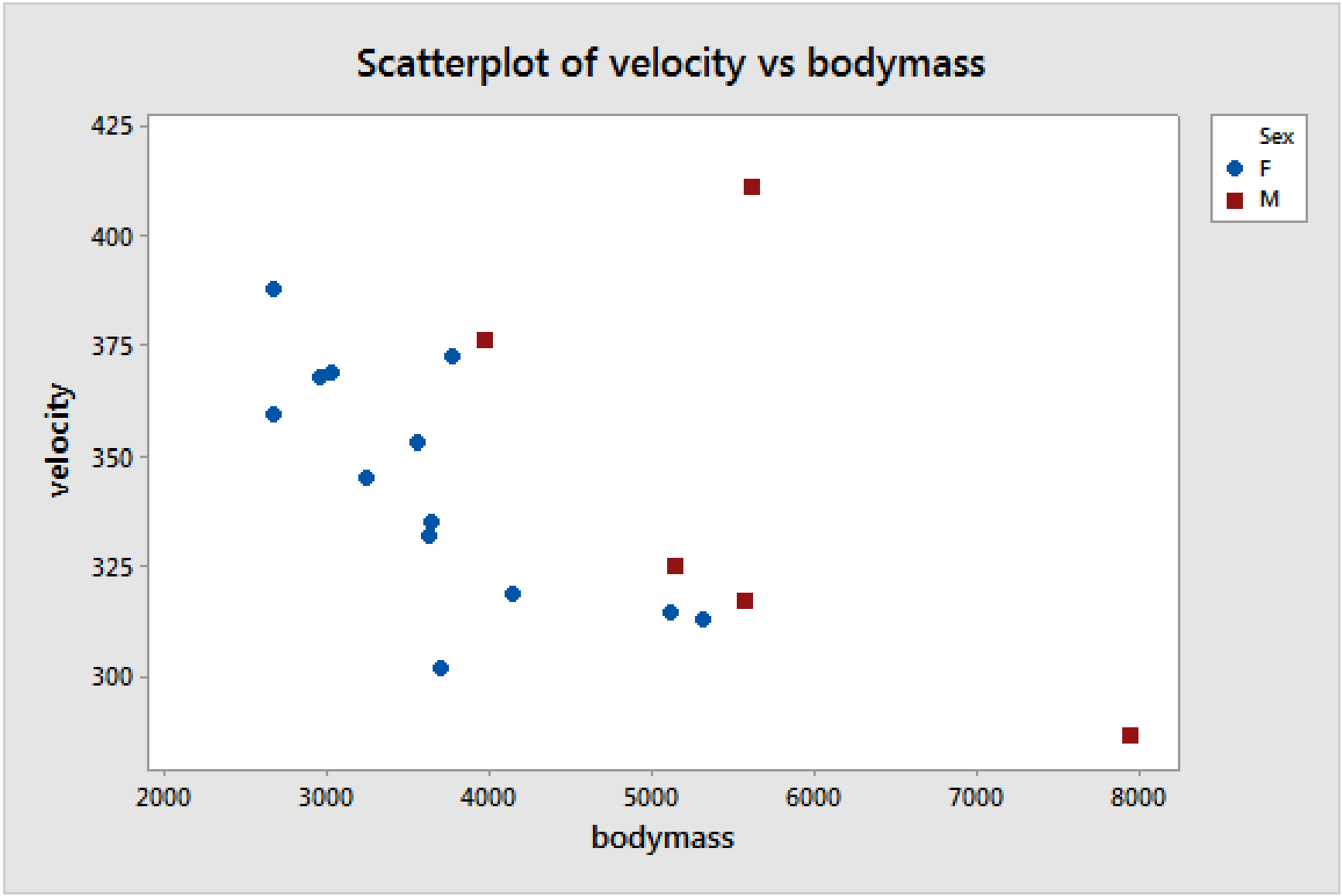
Inv. 5.6, part (h)


Scatterplot of velocity vs musclemass
velocity
425
400
375
350
325
300
40
50
60
70
80
90
100
musclemass

Inv. 5.6, part (h)


Scatterplot of velocity vs hindlimb
velocity
425
400
375
350
325
300
25
26
27
28
29
30
31
32
hindlimb

Inv. 5.6, part (i)


Scatterplot of velocity vs bodymass
velocity
425
400
375
350
325
300
2000
3000
4000
5000
6000
7000
8000
bodymass
Sex
F
M