1 Question 1

Fill in the table below with the distance and the number of shortest paths between each pair of vertices. (For example, if there are three shortest paths each of length 2, write 2 (3) in the table.)

	node 1	node 2	node 3	node 4	node 5	node 6
node 1	-	? (?)	? (?)	? (?)	? (?)	? (?)
node 2	-	-	? (?)	? (?)	? (?)	? (?)
node 3	-	-	-	? (?)	? (?)	? (?)
node 4	-	-	-	-	? (?)	? (?)
node 5	-	-	-	-	-	? (?)

????

2 Question 8

Make a histogram that shows the degree distribution for moc_data table.

```
In [ ]: moc_data.hist('degree')
```

3 Question 9

Make a histogram that shows the distribution of betweenness for moc_data table.

```
In [ ]: moc_data.hist('betweenness_centrality')
```

4 Question 10

Make a histogram that shows the distribution of eigenvector centrality.

```
In [ ]: moc_data.hist('eigenvector_centrality')
```

5 Question 11

Make a scatterplot that compares degree (x axis) and betweenness centrality.

```
In [ ]: plt.scatter(moc_data['degree'], moc_data['betweenness_centrality']);
```

6 Question 12

Make another scatterplot that compares degree (x axis) and eigenvector centrality.

```
In [ ]: plt.scatter(moc_data['degree'], moc_data['eigenvector_centrality']);
```

7 Question 13

In one or two sentences, how would you describe the relationship between these different centrality measures?

?

8 Question 14

Following the pattern from lecture, simulate `num_sims` SIR epidemics with $\beta =$`beta_param`. Then make a histogram of the distribution of the resulting number infected.
[NOTE: this will take about 5 minutes to run]

In [ ]:
```
np.random.seed(99)
num_infected = make_array()

# Running this simulation will take about 3min...
for _ in range(num_sims):
    num_infected = np.append(num_infected, np.sum(sim_epidemic(official_congress_twitter, beta=

moc_sir_res_table = Table().with_column('num_infected', num_infected)
moc_sir_res_table.hist()
```

9 Question 18

Based on these results, which innoculation strategy appears to be most effective across the range of vaccine budgets we investigated? Does this change your conclusion from before?

?