

Last name _____

First name _____

LARSON—MATH 356—CLASSROOM WORKSHEET 29

1. (a) Start Chrome browser.
(b) Go to `http://cocalc.com` and “Sign In”.
(c) Click project **Math 356**.
(d) Click “New”, call it **c29**, then click “Sage Worksheet”.

A **spanning tree** of a connected graph G is a subgraph of G that contains all the vertices of G which is a tree.

For a connected weighted graph, a **minimum weight spanning tree** is one whose edges have a minimum weight sum for all possible spanning trees.

2. Let $pete$ be the Petersen graph. Evaluate `pete=graphs.PetersenGraph()` and “show” the graph.

We need some examples of weighted graphs. Last week we coded the following function that puts random integer weights on the edges of a given graph g :

```
def random_integer_edge_weights(g,n): #weights will be in the interval [1..n]
    E = g.edges()
    for e in E:
        random_weight = randint(1,n)
        g.add_edge(e[0],e[1], random_weight)
    return g
```

3. Let `pete1=random_integer_edge_weights(pete,10).show(edge_labels=True)`. “Show” it and draw what you get. (This will be different for each student).

4. List the edges of your `pete1` graph from smallest weight to largest weight.

5. Now use Kruskal’s algorithm (by hand) to find a minimum weight spanning tree of `pete1` by hand, and draw what you get. What is the total weight of your spanning tree?

