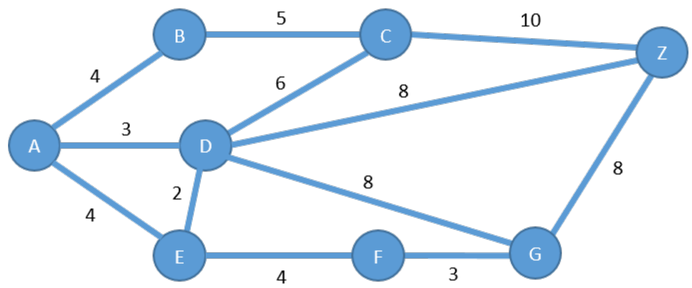
Last name ______________________

First name ______________________

LARSON—MATH 356—CLASSROOM WORKSHEET 05
Dijkstra's Algorithm & Orders of Magnitude

Review

- What is Dijkstra's algorithm?



1. Use Dijkstra's algorithm to find a shortest path from A to Z.

2. How "fast" is Dijkstra's algorithm? What can we say here?

Orders of Magnitude

3. Explain why e^x grows *faster* than x^α for any positive α.

4. Explain why 2^x grows *faster* than x^α for any positive α.

5. Explain why x^α grows *faster* than $\log x$ for any positive α.

Definition (little-o). We say that $f(x) = o(g(x))$ $(x \to \infty)$ if $\lim x \to \infty \frac{f(x)}{g(x)}$ exists and is equal to 0

6. Check these examples:

   (a) $x^2 = o(x^5)$.

   (b) $\sin x = o(x)$.

   (c) $14.709\sqrt{x} = o(\frac{x}{2} + 7\cos x)$.

   (d) $1/x = o(1)$.

   (e) $23 \log x = o(x^{.02})$

Definition (big-O). We say that $f(x) = O(g(x))$ $(x \to \infty)$ if $\exists C, x_0$ such that $|f(x)| < Cg(x)$ $(\forall x > x_0)$.

7. Check these examples:

   (a) $\sin x = O(x)$.