

# OPERATIONS RESEARCH WITH PROF LARRY SNYDER

## TALKING POINTS

1. What is the “newsvendor problem”, and what sorts of businesses might use it? (See *How can operations research be used for supply chain management?*)
2. What is “supply chain disruption”? What kind of events can cause disruption in a supply chain? (See *What causes supply chain disruption?*)
3. How does operations research help organisations to protect themselves against supply chain disruption? (See *How can operations research be used for supply chain management?*)
4. What kind of problems is operations research used to solve in the following fields? (See *About operations research and machine learning*):
  - Disaster relief
  - Healthcare
  - Airline management

Can you think of any other fields that could use operations research to solve problems?
5. How can computers “learn” to solve complex problems in machine learning? (See *About operations research and machine learning*)
6. What is the advantage of training computers to solve these problems instead of having humans solve them?
7. Humans make a lot of everyday decisions without even thinking about it, based on intuition or common sense. What kind of everyday problems do you think would be most difficult for a computer program to solve? Talk to your friend about this – did they give the same answer?

## ACTIVITIES YOU CAN DO AT SCHOOL, COLLEGE OR AT HOME

1. APICS, the association for supply chain management, has great games for different age groups on their website. Why not try the lemonade game (age 11-12) or the cell phone game (age 13-18)? Divide your class into teams, and build a human supply chain to learn about the cooperation and problem-solving that go into supplying a company. [www.apics.org/stem/activities/activities](http://www.apics.org/stem/activities/activities)

2. Play the root beer game, which helps you learn about the difficulties you might face in optimising your own supply chain. Larry helped build this version of the game: [rootbeergame.opexanalytics.com](http://rootbeergame.opexanalytics.com) You can play against an artificial intelligence (AI) player or against your classmates.

3. Solve the traveling salesman problem! Put some pegs in a board and wrap a string so that it touches every peg and returns to the first peg. How much string do you need? Challenge a friend to solve the problem using even less string!

## SURVIVAL SUPPLIES ACTIVITY

It is the zombie apocalypse. Your car has limited fuel in it, and you will not be able to refill your tank once you run out. You are planning one final mission to gather supplies. You have identified 10 locations that you would like to visit, but you do not have enough fuel to visit all of the locations. Therefore, you have assigned each site a number of “survival points” that indicate how valuable the site’s resources are.

The map below shows your base, as well as the sites you would like to visit and their survival points. Use a ruler to calculate the distance between any two sites. (Measure the distance between the dots on each site, and convert it to kilometers using the scale indicator.)

Your car has enough fuel to travel 45 km. Your mission will begin at your base and, of course, must end there as well (otherwise the zombies will get you on your way back).

Plan a route that collects as many survival points as possible and can be completed using only your available fuel.



The optimal route is: Base–City Hall–Hospital–Dr. Office–Toy Store–Grocery–Police Station–Library–Base. It has a total distance of 43 km and earns 22 total survival points.

SOLUTION: