The average number of vehicles waiting to exit a parking garage is approximated by

$$\frac{x^2}{2(1-x)}$$

where x is a quantity between 0 and 1, known as the **traffic intensity.**

Use these questions to generate a discussion – do not answer every question – leave something for others to talk about:

Plug in some numbers for x, like 0.1, 0.8, 0.9. What is happening as traffic intensity increases? What would happen if intensity ever reached 1? Why is this applicable to what we've learned in Chapter 6?

More Information:

It's not your imagination; traffic **is** getting worse. In the last 30 years while the number of vehicle-miles traveled has more than doubled, physical road space has increased only six percent.Yet building new roads is no guarantee of relief:
A counterintuitive result in traffic science is that a new road could actually increase the congestion in a network. Areas of mathematics like queuing theory and partial differential equations contribute to understanding traffic, which is a *backwards propagating wave*—cars move forward but the jam moves backward.

The mathematical study of traffic is relatively new, but a federal report concluded that the information revolution—that is, the combination of more powerful computers, telecommunications, and better numerical models—will affect transportation as much as the inventions of the automobile and jet engine. Analyzing traffic (like predicting weather) requires many variables (driver speed, length of trip, time of day, and origination point) and involves chaos theory (a small change down the road can drastically change travel conditions). Unlike weather, however, traffic can change in response to a forecast as alternative routes are chosen—today by drivers and, in the future, perhaps by the cars themselves.

For More Information: *What's Happening in the Mathematical Sciences,* Vol. 5, Barry Cipra