

# Guided Study Program in System Dynamics

System Dynamics in Education Project

System Dynamics Group

MIT Sloan School of Management<sup>1</sup>

## Assignment #30

Assigned on: Friday, June 25, 1999

Due by: Monday, July 12, 1999  
12:00 PM (Noon)<sup>2</sup>

WE WILL REVIEW THE RESPONSES ON MONDAY  
AFTERNOONS, BOSTON TIME.

LATE SUBMISSIONS WILL NOT RECEIVE FULL  
ATTENTION.

*Please email assignment solutions, questions, or comments to:*

*[gsp@sysdyn.mit.edu](mailto:gsp@sysdyn.mit.edu)*

*Save solutions with the filename XYZ-S30.doc*

*(where XYZ are your initials)*

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### **Reading Assignment:**

Please download and read the following paper from <http://sysdyn.mit.edu/gsp98/> :

- Properties of Damped Oscillations Systems, by Helen Zhu (D-4767)

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<sup>2</sup> The deadline is in United States Eastern Time, equivalent to Greenwich Mean Time minus 4 hours during US daylight savings time, and Greenwich Mean Time minus 5 hours for the rest of the year.

## **Exercises:**

### 1. Properties of Damped Oscillations Systems

Please read “Properties of Damped Oscillations Systems” (D-4767). This paper dampens the first model in “Oscillating Systems II: Sustained Oscillations” (D-4602). In this exercise, you study a damped version of the second model in “Oscillating Systems II: Sustained Oscillations” (D-4602).

After reading “Properties of Damped Oscillations Systems” (D-4767) please refer back to “Oscillating Systems II: Sustained Oscillations” (D-4602), and re-read the description of the Cleanliness of a College Dorm Room model.

Kevin’s roommate is not the only one who grows sick of seeing all of Kevin’s laundry on the floor. Eventually Kevin realizes that he himself is unable to find the papers that he needs for class or the pizza that he had ordered the night before. Kevin can really only tolerate a maximum of eight articles of clothing on the floor before his messiness begins to impede his lifestyle. When Kevin changes his clothes, he either drops them on the floor or, if he feels that his floor is too cluttered, goes to the trouble of putting them away.

A. Change the Cleanliness of a College Dorm Room model to reflect Kevin’s reaction to excessive laundry buildup. In your assignment solutions document, include the model diagram, documented equations, and graphs of the model behavior. Explain the behavior of the model in one or two paragraphs, contrasting the behavior of this model and the behavior of the model in the paper.

B. How would the behavior of the model change if Kevin dropped his clothes on the floor more frequently? Why? Justify your answers with graphs of model behavior.

C. How would the behavior of the model change if Kevin’s tolerance for laundry on his floor increased? Why? Justify your answers with graphs of model behavior.

### 2. Independent Modeling Exercise

“Americans have been fighting wildfire full tilt for more than half a century. In those years we’ve created a powerful system built on brave young firefighters, old bombers, modern trucks, helicopters, and a bear named Smokey. But at the same time foresters and ecologists have been learning that too much fire fighting can be as bad as none. Today many of them agree that if we try to keep fires out of forests completely, dead wood and other fuels build up. Then, instead of low fires that just clear out brush, flames climb into the crowns of monarch trees and kill them. These fires burn so hot they leave total devastation. [...]

