

Optional Unit 7: The Mathematics of Modeling and Coding

Goal: To understand the mathematics of network, coding, and piecewise models.

Expectations

1. use appropriate models to solve problems, such as those involving income tax brackets and postal/shipping rates.

Example:

Determine which shipping company should be used to send a nine-pound package to San Francisco, California, from Rockville, Maryland, if the package must be received by tomorrow.

2. apply algorithms to determine the check digit for identification numbers, such as universal product codes, vehicle identification numbers, and credit card numbers, and identify errors in recording and transmitting these numbers.

Example:

A textbook publishing company assigned the following ISBN codes for a particular book: ISBN-10: 1-4292-0900-3; ISBN 13: 978-1-4292-0890-0. How did the author of the textbook know that the ISBN-13 number was incorrect? How was the ISBN-13 number changed so that it was correct?

3. solve problems involving situations, such as scheduling tasks, making deliveries, finding shortest routes that can be represented by a vertex-edge graphs, and finding critical paths and Euler paths.

Example:

A salesperson needs to travel from the home office to each of 4 cities, then back to the home office. The number of miles between each location is listed in the table below. In which order should the salesperson visit the cities in order to minimize the total number of miles traveled.

Mileage Chart:

	Home	A	B	C	D
Home		200	150	30	300
A	200		310	220	120
B	150	310		110	420
C	30	220	110		130
D	300	120	420	130	