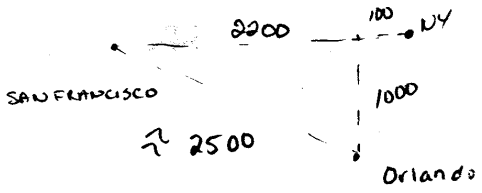
Test 1 solutions: Problem 2 (Estimation Problem: 15 points)

You and a friend are planning a two-week vacation out to the West Coast for a wedding in San Francisco next summer. However you're both on a tight budget. Your friend thinks it would be cheaper to drive his car than fly. A cheap plane fare from Orlando International Airport to San Francisco is $400 round-trip. Realistically estimate your travel expenses to and from the West Coast to see if your friend is right. What would your average speed be going from Orlando to San Francisco if you drove? Assume you will have free room and board at a relative's house once you arrive. Be sure to explicitly state all assumptions.

plane far = $400 round trip



Expenses

gas

food

hotel

Assumtions

- car can go 250 miles on one tank of gas
- $15 per day of travel per person
- It costs $30 to fill the gas tank.
- Distance from Orlando to San Francisco 2,500 miles
- Hotel cost is $30 per night, but it is shared by both people.

1) We will travel for 8 hours per day, going on average 60 mph.

Distance traveled each day = 480 miles

2) Number of days to get to San Francisco:

2500 miles ÷ 480 miles = 5.2 days

* They would arrive at their relatives house around lunch time.

3) Money Spent

(a.) gas: car can go 250 miles on one tank

2500 miles ÷ 250 $\frac{\text{miles}}{\text{tank}}$ = 10 tanks

Costs $30 per tank $30 × 10 = $300

total gas money: $300 split by 2 people

total gas money per person = $150

(b.) food: $15 per day for 5.2 days

3 meals per day plus breakfast on day 6.

$15 \times 5 + \frac{15}{3} = \$80$

total food money $80 per person

(c.) hotel: $30 per night shared by both people for 5 nights

$\frac{30}{2} \times 5 = \$75$

total hotel costs per person = $75

Total travel expenses: gas + food + hotel

$100 + $80 + $75 = $255.00 → one way

look on back ↓

$255 × 2 = $510.00 round trip

Average Speed

$$\text{average speed} = \frac{\text{total distance}}{\text{total time}} = \frac{2500 \text{ miles}}{5.2 \text{ days}} \times \frac{1 \text{ day}}{24 \text{ hrs}} = 20 \text{ mph}$$

* It would be cheaper to fly if you take into account the round trip costs

driving roundtrip = $510

flying roundtrip = $400

you would save $110

Instructor's Note: This is an excellent solution. The only thing that could be improved would be more use of symbol formulas on the previous page and better attention to units, i.e. 480 miles/day.

For estimates of the distance from Orlando to San Francisco, acceptable values were between 2,000 and 6,000 miles. Speeds of up to 80 mph were allowed but to receive full credit you need to account for tickets and lower speed limits (sections of the road are limited to 55 MPH).