M131: Using Math to Study the CSU Budget Crisis:
Why Are YOU Paying Higher Fees?

Student Learning Outcomes:
Students will better understand why their fees are increasing.
Students will write a simple math model.
Students will use basic arithmetic and algebra to solve for fee increases required to offset drops in enrollment and state revenue.

Background Reading

Many CSUN students are upset because they are being asked to pay higher fees for fewer classes. They feel that they are getting less for more. This Science 100 math exercise examines how changes in enrollment and fees affect the revenue used to operate the California State University (CSU) system.

The complete CSU budget is quite complex. It totals over $4 billion and supports 44,000 employees (faculty and staff) and about 400,000 students at 23 campuses. Many different sources of revenue help fund the CSU. These include student fees and general fund money as well as smaller sources such as continuing education, lottery money, grants, funds from auxiliaries, and recently, federal stimulus money. Student fees come to the CSU from enrolled CSU students. General fund money comes to the CSU from the state of California which collects the money from income taxes, sales taxes, corporate taxes, and other taxes.

CSU Total Revenue: A Math Formula

Total revenue = fee revenue + general fund revenue + smaller sources of funds.
At present, around 95% of CSU revenue comes from student fees and general fund money, so to simplify our arithmetic, we will ignore the smaller funding sources. The simplified total revenue will be called T, and we can write the formula for CSU total revenue like this:

$$T = F + G$$

(**T** = Total revenue simplified; **F** = Fee revenue; **G** = General fund revenue)

Discussing Enrollment: FTE vs. Headcount

To make comparisons easier between institutions, enrollment is usually given in terms of full time equivalent (FTE) students rather than in terms of headcount. An academic load of 15 units per semester generates one FTE undergraduate student, and an academic load of 12 units generates one FTE graduate students. We will therefore talk about enrollment in terms of FTE in this exercise.

Fee Revenue: Another Math Formula

The average student CSUN 2011-2012 fee per FTE is $7000. We can write the total fee revenue using a formula like this:

F = f * e
= 7000e

Fee revenue = **f**ee per FTE * **e**nrolled FTEs

In this formula, ***** denotes multiplication and **e** stands for enrollment or the total number of FTE students.

Take a break here: did you know that in the CSU, one third of your fees go back to student financial aid?

General Fund Revenue: Your Third Formula

California provides general funds to the CSU based on enrollment:

G = g * e

General fund revenue = **g**eneral fund per FTE * **e**nrollment

The Problem

Here's the problem. The CSU has a big deficit, roughly $650 million. Many CSU employees face layoffs, and students have had fewer classes to choose from. This situation may not improve for awhile: California is expected to have a $19 billion deficit this year.

Glossary of all the variables and formulas so far:

T = total revenue
e = enrollment
T(e) = total revenue as a function of enrollment (more students bring in more $)
FTE = full time equivalent student (how we count enrollment)
f = fee/FTE--what the average CSU student pays in fees
F = f * e is total fee revenue
g = general fund/FTE (what the state pays per student)
G = g * e is the total general fund revenue

Questions: Let's explore the following questions.

1. Write an equation that represents the relationship between total revenue and the fee per FTE, general fund per FTE, and enrollment (in FTE) using the variables T, f, g, and e.

2a. Suppose CSUN enrollment is 27,000 FTE, fee per FTE is $7000 and general fund per FTE is $4900. Use your equation from question 1 to find the total revenue. Then calculate the effect (in $) of cutting enrollment by 5%.

2b. What is the difference between the total revenue with no enrollment cut and 5% (2a)?

2c. Could a 10% fee increase make up for the money lost by a 5% decrease in enrollment?

2d. What size fee increase would be needed to offset a 10% decrease in enrollment? Use the total revenue T that you found in question 2a; Keep g = $4900 but set the new enrollment at 90% of 27,000 FTE.

2e. Next, find the fee increase required to offset a 10% decrease general fund per FTE and a 10% cut in enrollment. We are still assuming that we need the Total Revenue T = $321,000,000 to run the university

By H. Hellenbrand, C. Shubin and C. Spector, March 4, 2010
[updated September 11, 2012]

Sources:
http://www.calstate.edu/Budget

http://www.csun.edu/academic.affairs/

http://www-admn.csun.edu/budget/general_fund/gf-11-12.pdf
Note: we expect a $20 million decrease in the budget for AY 12-13 over AY 11-12