This handout touches on some of the math skills necessary for you to succeed in Econ 101. In the past, students who have difficulty with these topics often find the course material difficult as well. Please look carefully at this handout to make sure you are comfortable with the material. If you are not confident in your math ability, consider meeting with Professor Kelly during office hours to discuss your preparation for the course.

This is not an exhaustive list of all you need to know. As always, you are encouraged to look at Professor Kelly’s website for old exams and homeworks to use as practice. There is no better way to prepare for your exams this semester.

Note that Professor Kelly’s exams do NOT allow the use of a calculator. Make sure you are comfortable doing calculations by hand, including those that involve decimals or fractions.

I. Algebra of Lines

1. State if the follow pairs of lines do or do not intersect. If they do, solve for the intersection point or points.
   a. The line going through (0,3) and (2,1); the line going through (0,-1) with slope 3.
   b. The line given by 2x+5y=10 and the line going through point (6,0) with slope -2/5.

2. I have $40 to spend tonight. I can use it to buy sushi rolls ($8 a roll) or bottles of beer ($5 per bottle). Assuming I spend all $40, write the equation for the line that shows all the combinations of beer and sushi I can consume tonight. Give your answer both in \( y = mx + b \) form and \( Ax + By = C \) form, where x is sushi and y is beer. What are the x and y intercepts?

3. I have a line given by the equation \( y = 4x + 5 \). Suppose I want to shift every point on the line up by 2 units. What is the equation for the new line? Suppose instead I want to shift the line to the left by 1 unit. What is the equation for the new line?

4. Suppose y is the number of widgets I make, and x is the number of gadgets I use to make them. I find that my factory produces according to \( y = 8 + 3x \). Interpret. What are the units on the slope? What are the units on the y-intercept?

II. Percentages and Weighted Averages

5. Suppose my wage drops from $12.50/hour to $10/hour. What percent pay cut have I taken?
6. Suppose you have a course with 3 midterms and 1 final, worth 10, 20, 30, and 40 percent of your grade, respectively. You get an 84 on your first test, a 78 on your second test, and a 90 on your third.
   a. What’s your grade so far in the class?
   b. What grade do you need to get on your final to get a total of 87% in the class?

7. What score must I get on a 350 point exam in order to get 90?

8. I put $100 in my back account at the beginning of the year. I earn 4% interest a year. If I do not deposit or withdraw, how much will I have at the end of the first year? The second year? The third? In each year, round the bank’s interest deposits to the 2nd decimal place. What is the percentage increase in my back account after 3 years?

SOLUTIONS:

1.a. Equation for first line: \( y = -x + 3 \)
   Equation for the second line: \( y = 3x - 1 \)
   Intersection point (1,2)

1.b. No intersection point.

2. 
   \[ 8x + 5y = 40, \quad y = 8 - \frac{8}{5}x, \quad x \text{ intercept: } 5, \quad y \text{ intercept: } 8 \]

3. “shifted up by 2” new equation: \( y = 4x + 7 \)
   To find “shifted left by 1” equation: (Official 101 method)
   \[ y = 4x + 5 \]
   \[ x = -\frac{5}{4} + \frac{1}{4}y \]
   so the new equation is \( y = 4x + 9 \)

4. Units on slope: widgets per gadget. Units on intercept: widgets

5. 20% pay cut

6.a. 85%
   b. 90%

7. 315

8. $104, $108.16, $112.49; 12.49%