Learning MAPLE 11.

1. Go to a computer with Maple 11 installed on it. There are such computers in Mudd 416 and Olin 323. If you want Maple 11 installed on your personal computer, contact Randall Downer at ITS. His email is

     Randall.Downer (at) Colby.edu

2. Start Maple. Go to the File menu and select "New→ Worksheet".

3. Enter `4/15 + 1/17;`
   Write down how Maple responds.

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   Experiment ending arithmetic statements with colons, semi colons and nothing. What is the difference between the different ways of ending statements? (Your answer may depend on your version of Maple.)

4. To continue to the next line without making Maple respond use:
           Shift + Enter.
   Enter: `4/15 + 1/17;`
           `sin(Pi/8);`

   How does Maple respond?

5. In the last example, notice that Maple wrote the first answer as a fraction and did not evaluate the sine command. To obtain decimal answers, use the evalf() command.

   Enter: `evalf(4/15 + 1/17);`
              `evalf(sin(Pi/8));`
   Write down how Maple responds.

6. To define a variable name, use ":=". Enter:
   ```
   a := 5;
   b := 6;
   a*b;
   a + b;
   ```
   Write down how Maple responds.

7. Close down the worksheet you have been working on and start a new one.

8. We will now learn how to use linear algebra tools in Maple. Start by entering:
   `with(LinearAlgebra):`

9. There are multiple ways to define a 2x3 matrix

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$$

   Here is one way. Enter:
   `A:= Matrix(2,3,[1,2,3,4,5,6]);`
   Write down how Maple responds.

   Here is another way. Enter:
   `A:= Matrix([[1,2,3],[4,5,6]]);`
   Notice that the rows are inside brackets and that there are brackets and parentheses enclosing all the rows. Write down how Maple responded.

10. There is a 3rd way of entering a matrix (the shorthand approach). Use Maple's help menus to figure out what it is. Write down how you would enter the matrix A from the previous problem using the new method.

11. To define a column vector, enter:

```
x := Vector[8,9,10];
```

Write down how Maple responds.

There is another (short-hand) way of entering a vector. Use Maple's help to figure out what it is. Write down how you would enter the vector **x** from above.

12. To multiply a matrix times a vector, use a period:

```
A.x;
```

Write down how Maple responds.

13. Define the following matrix. You may need to use Maple's help menus to figure out how to enter the exact values of the numbers (i.e. don't use decimal approximations).

$$B = \begin{pmatrix} 1 & 1 & -1 \\ 2 & -1/2 & 3 \\ \sqrt{3} & 1 & 2 \end{pmatrix}$$

Use the period to multiply two matrices as well. Use Maple to find the matrix AB. What is the answer?

14. Suppose that we want to augment our matrix B with the vector

$$\mathbf{b} = \begin{pmatrix} 6 \\ \pi \\ \sqrt{2} \end{pmatrix}$$

Start by defining the vector **b**. You may need to use Maple's help menus to figure out how to enter the exact values of the numbers (i.e. don't use decimal approximations). Define the augmented matrix by entering:

```
AugB := <<B|b>>;
```
Write down how Maple responds

15. Now find the row-reduced echelon form for the augmented matrix by entering: `ReducedRowEchelonForm(AugB);`
Record the result here.

Now adjust the previous command so that the matrix entries are printed as decimals. Record the result here.

16. For your homework assignment, you will need to construct a random 3x3 matrix. You can do this with the command:

```
RandomMatrix(3);
```
If you want to give it a name, use the assignment operator.

```
M:= RandomMatrix(3);
```
Try this and record the result. As written, the entries of the matrix will be between -99 and +99. If you want to change this so that the entries are between 0 and 9 (for example), you would use:

```
M:= RandomMatrix(3,generator=0..9);
```
See Maple's help for other options.