Part 1 – Warm-up

In **y1**, enter **cos(x)**. Press ⁄ and select **7:ZoomTrig**. Use the graph to answer the following questions.

1. What is the range?

2. What is the amplitude? *A* =

3. What is the period? *T* =

Now change your calculator mode to split screen. Press 3 and select **TOP-BOTTOM** for **Split Screen**. For **Split 1 App**, select **Y= Editor**. For **Split 2 App**, select **Graph**. In **y2**, enter an equation in the form $y = A \cdot \cos(B \cdot x) + C$, where *A*, *B*, and *C* are integers. Press 2 + ' to swap applications to see the graph screen update. Press 2 + ' again to go back to the **Y= Editor** to modify your equation. To answer the following questions, modify the corresponding variable to observe the changes each variable has to the equation.

4. Describe the effect of increasing *A*.

5. Describe the effect of increasing *C*.

6. Describe the effect of increasing *B*.

7. What is the relationship between *B* and the period, *T*?

8. If a positive *D* shifts the graph to the right *D* units, what is the general sinusoidal equation for which this is true?

Part 2 – Collect & Analyze Data

You will collect data of a pendulum swinging. Using the skills reviewed in the warm-up, write a cosine function that models the data collected. Estimate the amplitude and period and phase shift, *D*, to the nearest tenth. If a motion detector is not available, use the lists *time*, *distance*, and *velocity* from your teacher and graph a function to model that data. To collect data, complete the following steps:

- Using an I/O cable, connect the motion detector to the graphing calculator.
- On the **HOME** screen, run the *Ranger* program. Select **1:Setup/Sample…**. Use the settings that appear to the right and press ß .
- Position the motion detector so that it is facing the pendulum, swing the pendulum, and press ß to begin collecting data.
- If your data doesn't look sinusoidal, press ß and select **3:Repeat Sample** to repeat the trial. Then press ß to begin collecting data again.
- Model the distance-time data with a function. Derive the velocity and acceleration equations. Select **7:Quit** when you are finished.

Record your position, velocity and acceleration equations for your experiment data here:

y =

v =

a =

Confirm your position and velocity equations by graphing them. To confirm your position equation, enter your equation in **y1** and select to show Plot 1 as shown to the right. To plot the velocity-time graph, use L1 for time and L3 for velocity. For the acceleration-time graph, use L1 for time and L4 for acceleration.