Action — **Reason**

- Return homework

  x minutes

  - Lessons on covariation

    Still not done.

  - Return homework from last week

    Marilyn will comment on them.
    FOR NEXT WEEK -- REDO ONE OF 4, 5, OR 6 USING ONLY DEFINITIONS OF ANGLE MEASURE AND DEFINITIONS OF SINE AND COSINE. CREATE A WORKSHEET FOR YOUR STUDENTS THAT WILL SUPPORT THEIR SEEING AN ANGLE MEASURE AS SOMETHING THAT CAN BE PUT ON A NUMBER LINE

  - Discuss PLC question050919 PLC A-H Prompt
  - Discuss precalc book's approach to radian measure

    They distinguish between the radius and 1 radian (as if a radian measures the opening and the radius wraps onto circle giving a measure of the circle in units other than 1 radius.

- Discuss this week's homework
  - y=cos(x) -- What does x stand for? What does cos(x) stand for?
  - Juan's insight -- come back to it.

    Have them restate it and say why it is important. (The importance is that by emphasizing this view, they are helping students see sin() and cos() always as always tacitly involving a composition--but sometimes the argument is f(x)=x.)

  - Explanation of cos(a*sin(bx)) behavior
    -
    - Demonstrate the case of cos(10(sin2x)) using unit circle. Show the value of *x* on the unit circle. Then the value of 2*x*. Ask teachers, "When you got a value of 10sin(2x), did you think to use a unit circle to estimate the value of cos(10sin2x))?"

      They will have forgotten that arguments to trig functions are arc lengths. Having them go begin with the unit circle for the variable, and then put the value of the argument back onto the unit circle, will remind them of this.

      - Break it into parts--sin(bx) cycles through its values b times as fast as sin(x). For every value of x, a*sin(x) produces values that are a times as large as sin(x). Thus, a*sin(bx) produces values between -a and a as x varies from 0 to 2π and as bx varies from 0 to 2bπ. Therefore cos() is evaluated at values from 0 to 2bπ. When a=1, cos() is evaluated at values of its argument that varies between -1 and 1. When a=2, cos() is evaluated at values of its argument between -2 and 2, etc.

        More practice with the mantra, *Variables vary; go slow!*

  - Investigation of sin(x)+ .001cos(1000x) behavior
    - Graph y=sin(x)+|.001cos(1000x)| and y'=|.001cos(1000x')| (to get parallel windows). Rescale both to see what is going on microscopically. Pause to understand what we are seeing.

      Teachers must coordinate two functions as well as their sum. More practice with *variables vary, go slow!*

    - Graph y=sinx to see base graph. Discuss why the bumps are slanted and why they break where they do.
  - Investigation of (x^n)sin(1/x)

Action **Reason**

- suggests that x*sin(1/x) approaches 1 as x gets very large. Look at u=1/x. Then this is (sin u)/u as u gets very small. Why does this work? Look at small values of u in comparison to sinu. They are almost the same length. HOWEVER, the ratio only approaches 1 if angles are measured in radians.
- QUIZLET
- Polar Coordinates
  - Laser pointer in a direction (laser pointer, measuring tape)
  - Two people, one at center the other at end of tape. A third person calculates the taper's distance from the center.
  - Look at some examples:
    - r=5-2θ; r=min(6,20-theta), etc.