1. (20 pts) Find the values of all six trigonometric functions, given  and .
2. (20 pts) Find , given that  and .
3. Consider the equation .
   1. (20 pts) Find all solutions *x,* in radians *and* degrees, to the equation in the interval .
   2. (10 pts) Find all real solutions *x*, in radians *and* degrees.

It may be easier for you to use degrees to solve and then convert to radians at the end.

1. (10 pts) Consider the equation . Find all solutions *x*  to the equation in the interval . (Do degrees and radians in final answer.)
2. (20 pts) Re-write  as an algebraic expression.
3. Find the *exact* value of  in two ways:
   1. (20 pts) Use a Sum identity.
   2. (20 pts) Use a Half-Angle identity

Meh. Turned it into  to keep from its spinning out of control.

Solutions work: , so the argument, , is coterminal with , in the 4th quadrant. The easiest #s I could come up with to sum to 19 were 16 and 3; hence,





1. (20 pts) What is the area of the sector intercepted by an arc of  in a circle of radius 30 cm? Exact answer or answer rounded to 4 decimal places.
2. (10 pts) Multiply . Give your final answer in trigonometric form and also in standard  form. The standard form of the answer you may round to 2 decimal places, but you shouldn’t be at all freaked-out by radicals running around, either.
3. (10 pts) Divide . Give your final answer in trigonometric form and also in standard  form. The standard form of the answer you may round to 2 decimal places.
4. Powers and roots:
   1. (10 pts) Let . Find 
   2. (10 pts) Find all 5th roots of *z*. In other words, find all complex solutions to the equation .

Bonus

1. (10 pts) Build a cosine function that achieves its maximum height of *y* = 27 meters at time *x* = 7 seconds and its minimum height of  meter at *x* = 27 seconds.
2. (10 pts) The diameter of a bicycle’s wheels is 27 inches. If the wheels are spinning at 100 rpm , how far does the bike travel in 20 minutes? Convert your final answer to miles, rounded to two decimal places. (12 inches = 1 foot. 5280 feet = 1 mile).

