MAT 122 Final Test, Part 2 – Fall, 2019 Name A00315267 Rivera, Erika
100 Points Chapter 6 (plus comprehensive NO GRAPHING CALCULATORS!!!

Do all your work and submit answers with your work, on the separate paper provided. Organize your work for efficient grading and feedback. Leave a margin, especially in the top left, where the staple goes!

Leave space between problems. No prizes for saving paper, here. Figure this stuff out, and use your smarts to plant trees! Only use one column of work. Don't start a 2nd column to save paper. ALL I WANT ON THIS PAGE IS YOUR NAME.

1. Consider the parametric equations $x = \sqrt{t}, y = t - 3$.
   a. (10 pts) Create a table of *x*- and *y*-values corresponding to *t* = 0, 1, 2, 3.

   b. (10 pts) Plot the points (x, y) generated in part 'a.' Use an arrow to indicate direction of increasing *t*.

   c. (10 pts) Find the rectangular equation $y = f(x)$ by eliminating the parameter, and sketch its graph. Make this graph separate from your graph in part 'b.'

2. a. (20 pts) Sketch the graph of $f(x) = 2\sin(x) + 1$ in rectangular coordinates. Show the midline as a dotted line. This we've been doing since Chapter 1.

   b. (20 pts) Sketch the graph of $r = 2\sin(\theta) + 1$ in *polar* coordinates, which is the last thing we learned about. This is the Chapter 6 part of this problem.

   c. (20 pts) Use your work in '2a' to assist your sketch of $f(x) = 2\sin(2x) + 1$, in rectangular coordinates

3. (10 pts) Given $\sin(u) = -\frac{2}{\sqrt{13}}$ and $\cos(u) < 0$. In what quadrant is 2*u*?

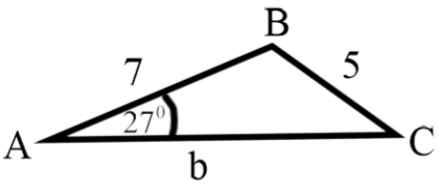
Bonus: Attempt up to 40 points of bonus. I take the first 40 points attempted I see. If you change your mind about working one, just put one big 'X' through it. I may find some points for you that you didn't think you wanted.

Bonus 1 (10 pts) Find all zeros of the trigonometric polynomial $4\cos^3(\theta) - 2\cos^2(\theta) - 2\cos(\theta) + 1 = 0$ in the interval $[0, 2\pi)$.

Bonus 2 (10 pts) If you worked the first bonus problem, above, you're half done with this one. Find all zeros of the trigonometric polynomial:: $4\cos^3(3\theta) - 2\cos^2(3\theta) - 2\cos(3\theta) + 1 = 0$ in the interval $[0, 2\pi)$.

Bonus 3 (10 pts) Build a *sine* function that achieves its maximum height of *y* = 200 meters at time *x* = 7 seconds and its minimum height of $y = -130$ meters at *x* = 19 seconds.

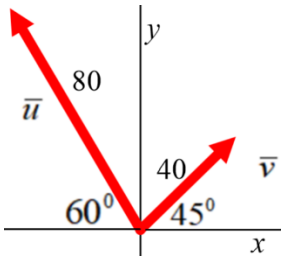
Bonus 4 Consider the triangle in the figure. Assume lengths are in centimeters. In Part 1 of this test, you proved that there were 2 possible triangles, representing the case where the angle B is obtuse.



(a) (10 pts) Draw the diagram for the case where angle B is acute (and hence angle C is obtuse). What is the measure of angle C in the case that angle B is acute? Give angle C to 4 decimal places.

(b) (10 pts) Use the Law of Cosines to find the length of side b.

Bonus 5 A man is walking 2 dogs at the same time. One is pulling with 80 pounds of force ahead and to the left and the other is pulling with 40 pounds of force ahead and to the right. See diagram for more specific information.



(a) (15 pts) Tell me EXACTLY what net force the dogs are exerting on the man, as a vector. Give this answer in simplified radical form.

(b) (5 pts) Give the answer to part (a) to 4 decimal places.