MAT 1420-R11 Writing Project #2 – Spring, 2024 Name_____
120 Points Preparation for Written Final
Covers Chapters 3, 4, and 6.

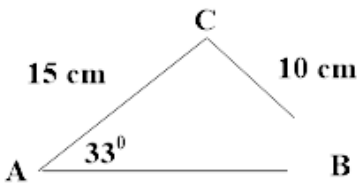
This assignment is due Friday, May 3rd. Late assignments will be accepted as late as Tuesday, May 7th, for a 20% discount.

FORMATTING: This is semi-formal writing, here. That means show some professionalism. You must not type it out, but you do need to be very clear. I'd rather you used pen and put a single line through your mistakes than a pencil, if your pencil writing is at all faint. I'm struggling with cataracts this semester on top of my glaucoma, and it really slows things down when your work is not high contrast.

1. Plain white background. You can use paper and scan it, or use a pen tablet and save directly to PDF. If you use paper, it needs to be plain 8 ½- by 11-inch paper that you then scan to PDF.
2. Leave at least 1/2-inch margins, and plenty of white space (for teacher annotations) between and around problems, throughout the assignment. Cramped work will cost 20% of your grade, and may not be graded at all, if it's too cramped.
3. Do not use more than one column. I'm looking for #2b UNDER #2a, #3 UNDER #2, … (and so on), not crammed in beside it!
4. Write DARK. I don't mind if you use pen. Just put a line through mistakes. Sometimes you end up getting credit for such errors, because you were right the first time and changed your mind!
5. I set a semi-bad example, because I'm worried about 100 students making copies of my solutions, which *is* a waste of paper, so my solutions tend to be at least slightly cramped, compared to what I'm asking of you.

Chapter 3 Content

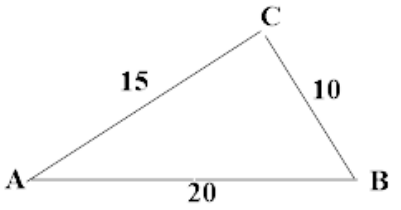
1. Ch 3 Suppose $A = 33^0$, $a = 10$ cm, and $b = 15$ cm. (See figure.)



   a. (5 pts) Show that there are two solutions to this triangle, before solving the triangle.

   b. (5 pts) Find both solutions. For one, *B* will be acute. For the other, *B* will be obtuse. Round final answers to 3 decimal places.

2. Ch 3 Suppose $a = 10$, $b = 15$, $c = 20$. Solve the triangle. Round final answers to 3 decimal places. See figure.



3. Ch 3 Let $\overline{u} = \langle 2, -3 \rangle$ and $\overline{v} = \langle -1, 5 \rangle$. Compute or sketch, as directed:
   a. (5 pts) $\|\overline{u}\|$ (Use dot product).

   b. (5 pts) The direction angle for $\overline{u}$. Use degrees. Round final answer to 3 decimal places.

   c. (5 pts) The angle between $\overline{u}$ and $\overline{v}$. Use degrees. Round final answer to 3 decimal places.

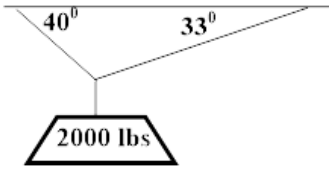
d. (5 pts) The resultant of $\overline{u}$ and $\overline{v}$.

e. (5 pts) $\text{proj}_{\overline{v}}\left(\overline{u}\right)$.

f. (5 pts) Sketch the vectors $\overline{u}$, $\overline{v}$, and $\overline{u}+\overline{v}$ on the same set of coordinate axes.

g. (5 pts) Sketch the vectors $\overline{u}$, $\overline{v}$, $\text{proj}_{\overline{v}}\left(\overline{u}\right)$, and $\overline{u}-\text{proj}_{\overline{v}}\left(\overline{u}\right)$ on the same set of coordinate axes. Don't over-write your sketch from part f. Start a new sketch.

4. Ch 3 (15 pts) A weight of 2000 lbs is suspended from two hooks in the ceiling. Find the tension in each cable. (See figure.) Round final answers to 3 decimal places.



5. Ch 4 (10 pts) Use the fact that $z = 2 + 3i$ is a zero of $f\left(x\right)=x^4-9x^3+19x^2-9x-182$ to obtain a linear factorization of $f\left(x\right)$, that is, split f into linear factors by finding all its zeros.

6. Ch 4 Let $z=3\left(\cos\left(33^0\right)+i\sin\left(33^0\right)\right)$ and $w=7\left(\cos\left(11^0\right)+i\sin\left(11^0\right)\right)$. Compute the following.

a. (5 pts) zw

b. (5 ps) $\dfrac{z}{w}$

7. Ch 4 Let $z=32+32i\sqrt{3}$.

a. (10 pts) Find all 5th roots of z. Leave your answers in trigonometric form. Use exact radians (i.e., π-radians).

b. (5 pts) Convert your answers in part a to standard form. Round results to 3 decimal places.

8. Ch 4 Consider the following:

$x=2+3\cos\left(\theta\right)$

$y=3-5\sin\left(\theta\right)$

a. (5 pts) Sketch the curve represented by the parametric equations. Indicate the orientation of the curve.

b. (5 pts) Eliminate the parameter and write the resulting rectangular equation whose graph represents the curve.

9. Ch 6 Convert the equations to polar form:

a. (5 pts) $x-3y+5=0$

b. (5 pts) $x^2+y^2=25$

10. Ch 6 (5 pts) Sketch the graph of the polar equation $r=5\left(1+2\cos\left(\theta\right)\right)$

11. Ch 6 (10 pts) Find the polar equation of the ellipse with vertices $\left(2,\frac{\pi}{2}\right),\left(4,\frac{3\pi}{2}\right)$.

Your *actual* final will be a selection of problem types from Writing Project #1 and Writing Project #2, with an emphasis on question types from Writing Project #2.