MAT 122 Pre-Test 1 – Spring, 2017 Name_____
100 Points Covers Chapter 1 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 corner! Let's keep this paper-clip thing going, so I can scan these pre-tests and send them to you, for further study over the weekend.

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 TEST COVER SHEET IS YOUR NAME. No points for answers on this page.

YOUR GRADE ON THIS PRE-TEST IS ONLY FOR YOUR INFORMATION.

1. (10 pts) Find two angles, between -2π and 2π (i.e., 0^0 and 360^0) that are coterminal with $-\frac{23\pi}{6}$. Give exact answers in degrees and radians.

2. .(5 pts) Arc Length. Suppose we have a kid's wagon wheel of radius r = 7 cm. How far does the wagon wheel roll along the ground if it rotates thru an angle of 6000^0? Round to 3 decimal places.

3. (5 pts) Find the *exact* area of the sector that is intercepted (swept through) by an angle of $\theta = \frac{2\pi}{3}$ on a circle of radius r = 12 cm.

4. Answer the questions about the equation $\csc(\theta) = -\frac{5}{2}$.

   a. (5 points) Sketch two triangles that satisfy $\csc(\theta) = -\frac{5}{2}$.

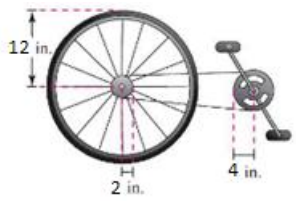
   b. (5 pts) Suppose that $\cos(\theta) > 0$. Find the other five trigonometric functions of θ.

   c. (5 pts) Assume $0 \le \theta < 2\pi$, find θ, in radians *and* degrees, rounded to 3 decimal places.

   d. (5 pts) Give *all* solutions to the equation $\csc(\theta) = -\frac{5}{2}$, in degrees *and* radians, rounded to three (3) decimal places.

5. (10 pts) Sketch one period of the graphs of $y = \cos(x)$ and $y = \sec(x)$ on the same set of coordinate axes.

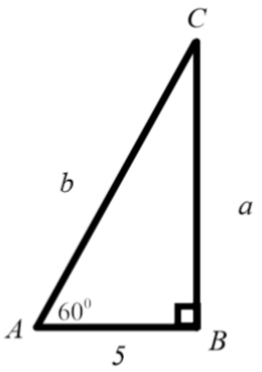
6. (10 pts) The radii of the pedal sprocket, the wheel sprocket, and the wheel of the bicycle in the figure are 5 inches, 3 inches and 15 inches, respectively. A cyclist is pedaling at a rate of 1.4 revolutions per second. Find the speed of the bicycle in feet per second. Then convert that to miles per hour. Round final answers to 1 decimal place.



7. (10 pts) Sketch the graph of $f(x)=13\cos\left(\frac{\pi}{20}x+\frac{7\pi}{20}\right)+12$.

8. (10 pts) Write the cosine function that achieves its maximum height of y = 117 feet at time t = 11 seconds and its minimum height of $y=3$ feet at t = 39 seconds.

9. (5 pts) Solve the triangle. That means, find all lengths and angles. Exact answers required.



10. Find the exact value of…
    a. … (5 pts) $\sin\left(\arctan\left(\frac{12}{5}\right)\right)$.
    b. … (5 pts) $\arcsin\left(\cos\left(\frac{3\pi}{4}\right)\right)$

11. (5 pts) Draw the sketch and use it to find an algebraic expression that is equivalent to $\cos(\arctan(2x))$

Bonus: Answer *two* of the following, for *up to* 10 points:

12. (5 pts) Sketch the picture(s) corresponding to the following information, *if possible*. If it is *not* possible, briefly explain why.
    a. $\cos(x)=0$
    b. $\cos(x)=1$
    c. $\sin(x)=\frac{\sqrt{7}}{5}$
    d. $\cos(x)=\frac{5}{\sqrt{7}}$
    e. $\sin(x)=0$

13. (5 pts) Sketch the graph of one period of $y=\tan(x)$ (restricted to make it 1-to-1) *and* $y=\arctan(x)$ on the same set of coordinate axes. I want to see the function and its inverse in the same picture. Label key points as ordered pairs (ALWAYS). State the domain and range of the restricted sine function and its inverse.

14. (5 pts) Sketch the graph of one period of $y=\cos(x)$ (restricted to make it 1-to-1) *and* $y=\arccos(x)$ on the same set of coordinate axes. I want to see the function and its inverse in the same picture. Label key points as ordered pairs (ALWAYS). State the domain and range of the restricted cosine function and its inverse.

15. Explain, in your own words, how to reason to the arc-length and area-of-a-sector formulas.