

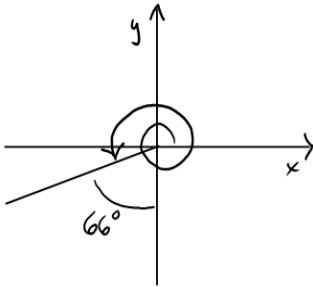
Math 163 – Test #3 (Version A)

December 4, 2015
Instructor: Patricia Wrean

Name: _____

Total: 40 points

1. Consider the following sketch of an angle θ in standard position. The swirly line indicates the number and direction of rotations. Calculate the size of the angle, and list one positive and one negative coterminal angle. Also, state the reference angle and whether $\tan \theta$ is positive or negative. (5 points)

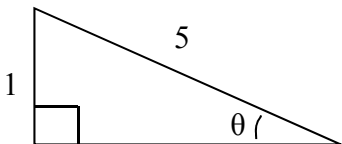


angle θ : _____
coterminal angles: _____
reference angle: _____
 $\tan \theta$: positive / negative

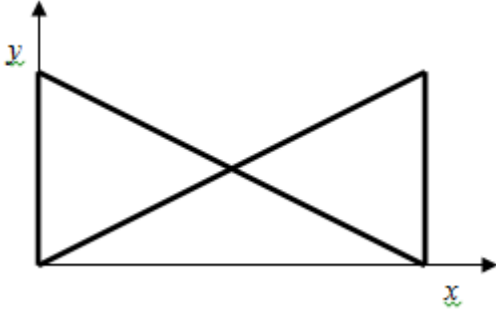
2. Use a calculator to evaluate the following trig functions. Round any approximate answers to two decimal places. (4 points)

- a) $\sin(81.5^\circ)$ _____
b) $\cos(-1022^\circ)$ _____
c) $\tan^{-1}(1.23)$ _____
d) $\cos^{-1}(1.23)$ _____

3. Find the **exact** values of the three basic trig functions of θ for the following triangle. (5 points)

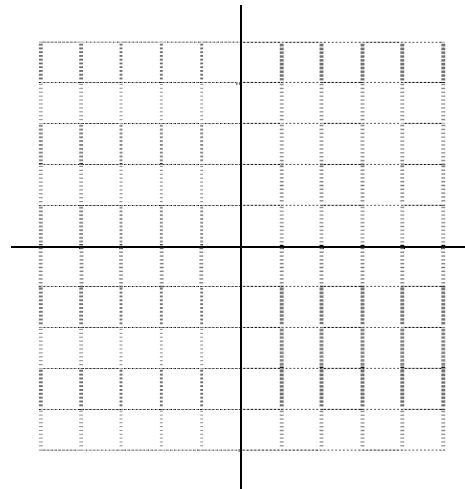


4. The JOIN operator is a symmetrical symbol made from two equilateral triangles, as shown in the diagram below. If each equilateral triangle has a side of length 2.4 mm, what are the coordinates of the point at the upper right hand corner of the diagram? (Be sure to include your units and round appropriately.) (4 points)



5. Sketch the graph of the following function. Include at least two accurate points on the graph, be sure to label your graph appropriately, and indicate the location of any asymptotes. (5 points)

$$y = \left(\frac{1}{3}\right)^x$$



6. Solve the following equations. Give exact answers. (4 points)

a) $3^{2x} = 22$

b) $\log_2(23 - 3y) = \log_2(2y - 12)$

7. Solve the following equation. Give an **approximate** solution rounded to two decimal places. (4 points)

$3(1.01)^{x+1} = 24$

8. Write as a single logarithm and simplify. Show your work. (3 points)

$$\log_b(ab^2) - \log_b a$$

9. Computer scientists studying “linkrot” have found that exponential decay is a good model for the number of links that remain usable on a web page as a function of time. Two researchers created a page with 510 links to science education resources in August 2000. Exactly two years later, they found that only 370 of those links were still working. If their model is accurate, how long will it take (from the original date of August 2000) for only half of the original links to still work? (6 points)