

By providing my signature below I acknowledge that I abide by the University's academic honesty policy. This is my work, and I did not get any help from anyone else during the exam:

Name (sign): _____

Name (print): _____

Student Number: _____

Instructor's Name: _____

Class Time: _____

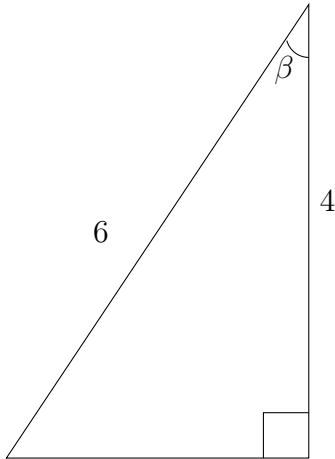
Problem Number	Points Possible	Points Made
1	28	
2	6	
3	6	
4	12	
5	12	
6	12	
7	12	
8	12	
Total:	100	

- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- If you make use of a theorem to justify a conclusion then state the theorem used by name.
- Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.
- The total number of possible points that is assigned for each problem is shown here. The number of points for each subproblem is shown within the exam.
- Please turn off your mobile phone.
- A calculator is not necessary, but numerical answers should be given in a form that can be directly entered into a calculator.
- Common identities:

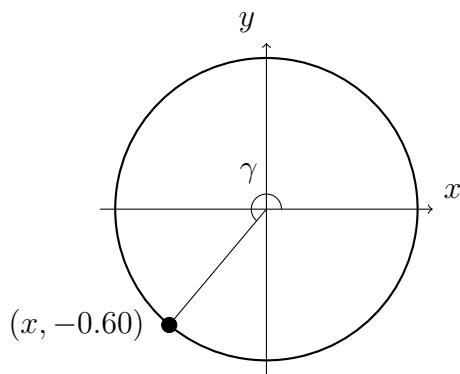
$$\begin{aligned}\cos(\alpha + \beta) &= \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta), \\ \sin(\alpha + \beta) &= \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta).\end{aligned}$$

1. Determine the values of the requested quantities in each question below. Numerical values should be to within 0.01 of the true value. **(All angles are given in radians and should be expressed in radians if you have to determine their value.)**

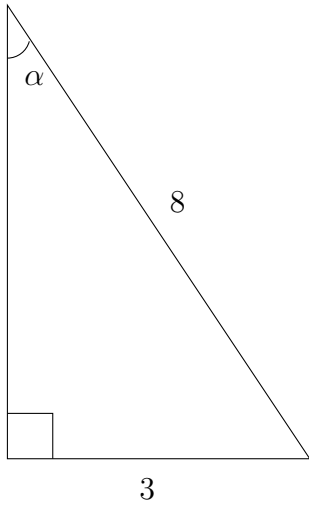
_____ (a) [7 pts] Determine the cosine, sine, and tangent of the angle β in the diagram below.



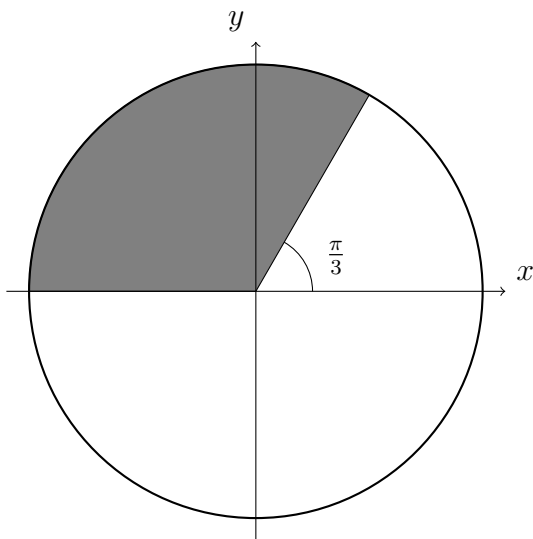
_____ (b) [7 pts] Determine the cosine, sine, and tangent of the angle, γ , in the diagram below. The point shown is on the unit circle.



- _____ (c) [7 pts] Determine a numerical approximation to the measure of the angle α in the diagram below. Your answer should be in radians and should be to within 0.01 of the true value.



- _____ (d) [7 pts] Determine the area of the shaded region below. The circle has a **radius of three**.



2. [6 pts] Determine the reference angle for $\theta = 2.5$ radians.

3. [6 pts] Determine the exact value of the expression

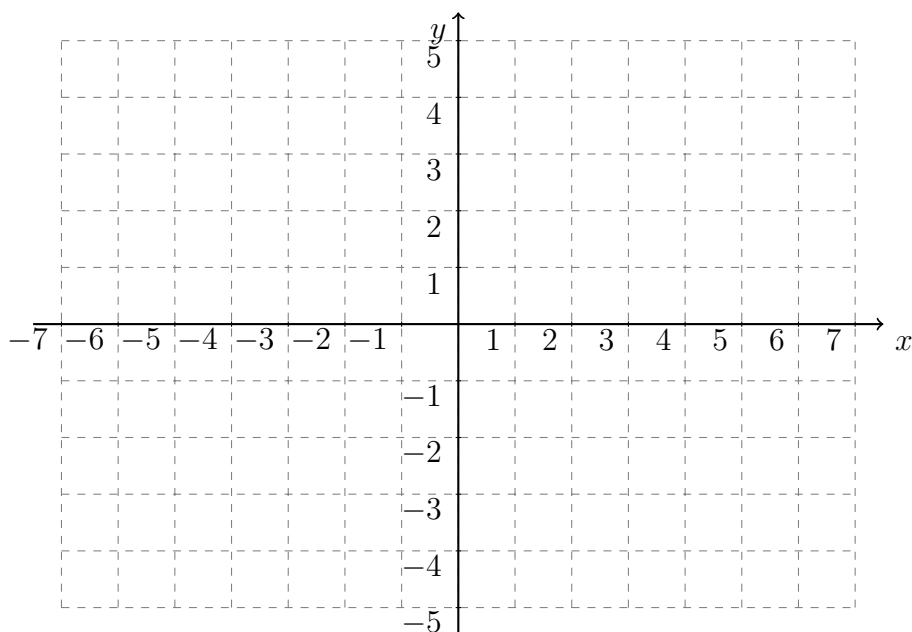
$$\sin(\arctan(2.1)).$$

If the value does not exist explain why. (Do not use a value from a calculator but find the expression for the exact number.)

4. [12 pts] Determine a formula for the sine wave that oscillates between two and eight. It has a minimum at $x = 2$, and the wave repeats every five units (i.e. the period is five).
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5. [12 pts] Use the axes below to make a sketch of the function
-

$$w(x) = 2 \sin\left(\frac{\pi}{2}x - \frac{\pi}{4}\right) - 3$$



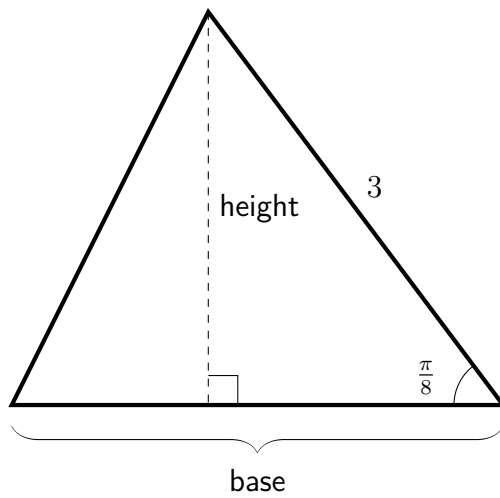
6. [12 pts] A bird watcher is looking at a bird in a tree. She estimates that the angle of elevation of her binoculars is 4° , and the tree is approximately thirty-five meters away from her. The bird watcher is 1.7 meters tall. How high above the ground is the bird?

7. [12 pts] Determine if the following expression is an identity and show your work:

$$(\tan(\theta))^2 - (\sec(\theta))^2 = 1.$$

If it is not an identity determine if a small (minor) change can be made to turn it into an identity.

8. [12 pts] The area of a triangle is one half the length of its base multiplied by its height. The area of the triangle below is 5.5. Determine the length of the base of the triangle.



Extra space for work. **Do not detach this page.** If you want us to consider the work on this page you should print your name, instructor and class meeting time below.

Name (print): _____ Instructor (print): _____ Time: _____