

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: _____

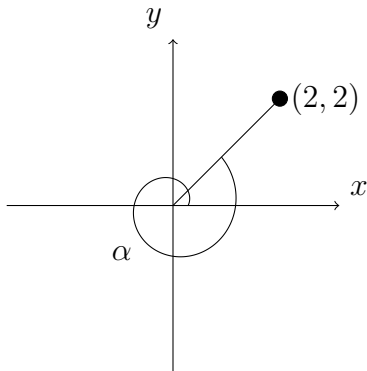
Problem Number	Points Possible	Points Made
1	28	
2	6	
3	6	
4	12	
5	12	
6	12	
7	12	
8	12	
Total:	100	

- 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:

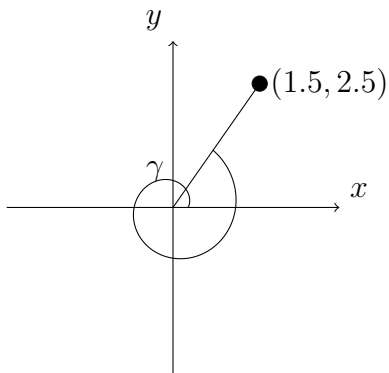
$$\begin{aligned}\cos(\alpha + \beta) &= \cos(\alpha) \cos(\beta) - \sin(\alpha) \sin(\beta), \\ \sin(\alpha + \beta) &= \sin(\alpha) \cos(\beta) + \cos(\alpha) \sin(\beta).\end{aligned}$$

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.)**

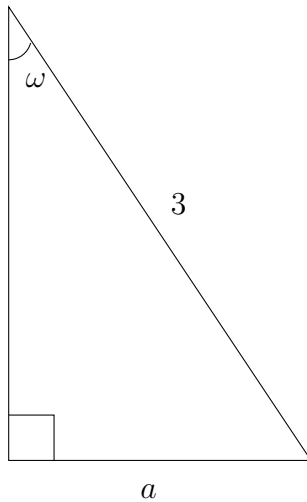
_____ (a) [7 pts] Determine the radian measure of the angle α in the diagram below:



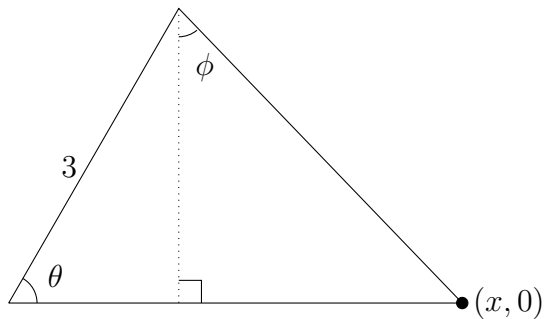
_____ (b) [7 pts] Determine the cosine, sine, and tangent of the angle, γ , in the diagram below.



- _____ (c) [7 pts] Determine a numerical approximation to the measure of the side a in the diagram below. Your answer should be to within 0.01 of the true value. The angle ω is 0.80 radians.



- _____ (d) [7 pts] The measure of the angle θ is 0.4 radians, and the measure of ϕ is 0.3 radians. Determine the value of x to within 0.01.



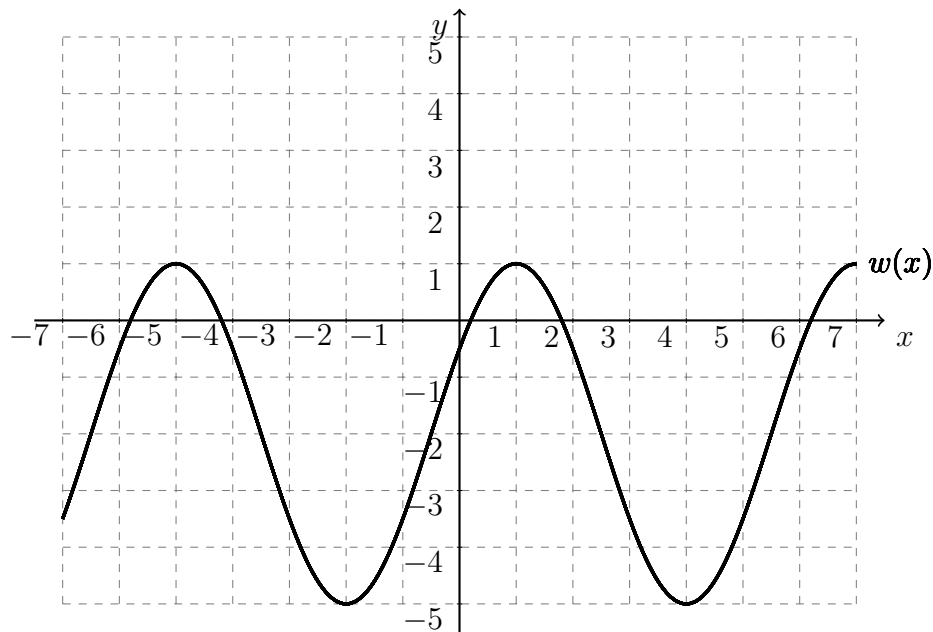
2. [6 pts] Determine the reference angle for $\theta = 4.1$ radians.
3. [6 pts] A car travels along a straight line that starts six miles east and eight miles south of downtown Athens until it reaches a point that is two miles east and two miles south of downtown Athens. It then gets on the loop road which is a perfect circle centered at downtown Athens. The car travels around a sector whose angle is 1.3 radians. What is the total distance that the car traveled?

4. [12 pts] Given that

$$\cos\left(\frac{11\pi}{12}\right) = -\frac{\sqrt{2} + \sqrt{6}}{4}$$

determine the exact value of $\sin\left(\frac{11\pi}{12}\right)$.

5. [12 pts] Please determine a formula for the function below expressed as a sine function.



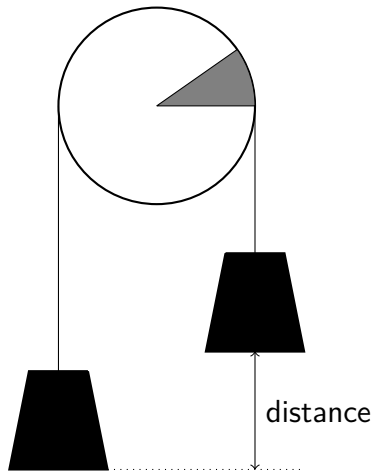
6. [12 pts] The elevation of a plane is 450m above the ground. The pilot is looking at the control tower of the airport, and the angle of depression is 9.5° . What is the horizontal distance between the airport and the point on the ground directly below the plane?

7. [12 pts] A pendulum is included as part of a science exhibit. For any time, t given in seconds, the height of the pendulum above the floor in meters is determined to be

$$h(t) = 0.3 + 0.2 \cos(0.2t + 0.8).$$

Determine two times that the height is at a maximum and determine two times that the height is at a minimum. What are the heights at those times?

8. [12 pts] Two weights are attached to one another using a rope that goes over a pulley. Initially the two weights are at the same level. The pulley has a radius of 0.2m, and it turns through some angle. The ropes does not slip nor stretch. The sector representing the angle it turns has an area of 0.007 m^2 . What is the vertical distance between the two weights?



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: _____