

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: _____

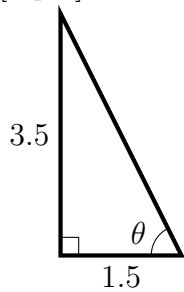
Problem Number	Points Possible	Points Made
1	20	
2	18	
3	10	
4	12	
5	20	
6	10	
7	10	
Total:	100	

- 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:

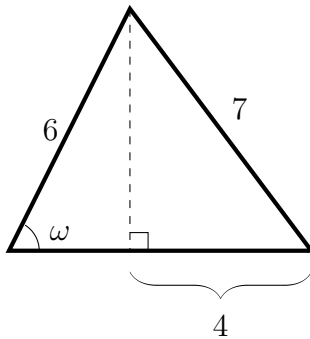
$$\begin{aligned}\cos(\alpha + \beta) &= \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta), \\ \sin(\alpha + \beta) &= \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta).\end{aligned}$$

1. In each question below a diagram is given. Determine the value of the trigonometric functions requested for each part.

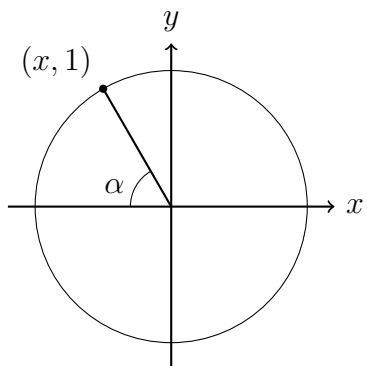
_____ (a) [6 pts] Determine the exact value of $\cos(\theta)$.



_____ (b) [7 pts] Determine the exact value of $\sin(\omega)$.



_____ (c) [7 pts] Determine the exact value of $\cos(\alpha)$ in terms of x .



2. For each question below determine the radian measure of the angle that matches the given criteria.

_____ (a) [6 pts] The angle, γ , where $\frac{\pi}{2} \leq \gamma \leq \pi$, and the reference angle for γ is $\frac{\pi}{3}$.

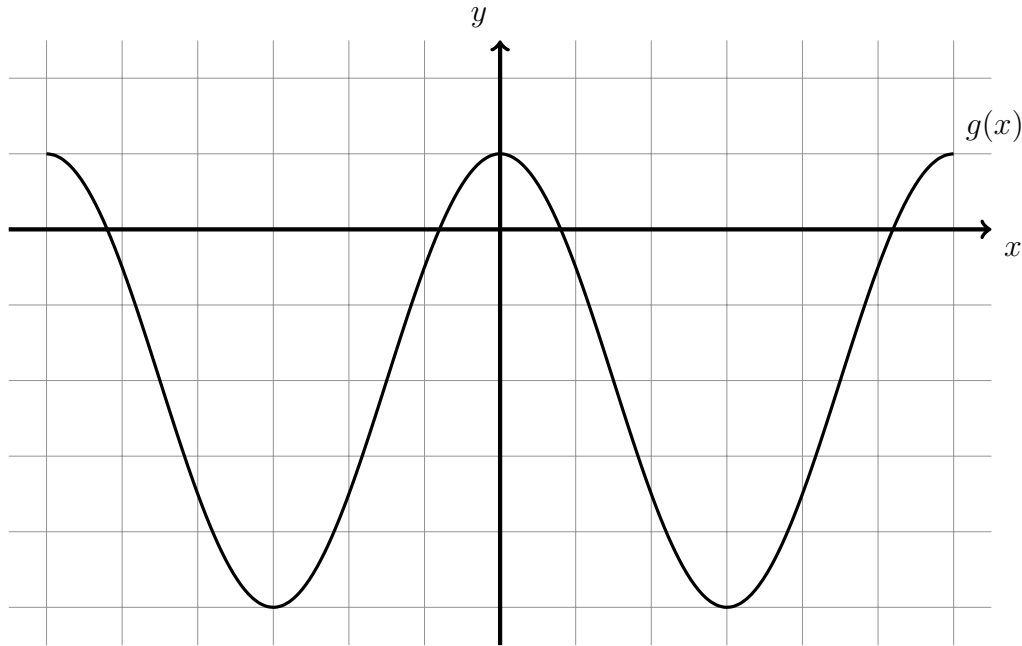
_____ (b) [6 pts] A sector with radius 3 meters is subtended by an angle, ϕ , and the arc length of the sector is 2.1 meters.

_____ (c) [6 pts] The angle, β , whose sine is -0.45 , and the angle is in the third quadrant. (You can use an approximation based on a calculator result.)

3. [10 pts] A function is shown in the figure below. Each square on the grid is one unit in length. The function can be expressed as

$$g(x) = K \sin(l \cdot x + m) + N,$$

where K , l , m , and N are constants, and K and l are positive.



Determine a formula for g . (What are the numeric values for K , l , m , and N ?)

4. Determine the exact number that represents the values requested below. Your result should not be in terms of any trigonometric function. All angles are given in radians. **Show your work and do not provide calculator results.**

(a) [6 pts] Determine the value of $\sin(\alpha)$ where $\cos(\alpha) = 0.65$, and α is in the fourth quadrant.

(b) [6 pts] Determine the value of $\tan(\beta)$ where $\cos(\beta) = 0.2$ and $\pi \leq \beta \leq 2\pi$.

5. Determine the exact equation or number that represents the values given below. Show your work and do not provide calculator results. Your result should not be in terms of any trigonometric function. All angles are given in radians.

(a) [6 pts] $\cos(\arccos(0.1))$

(b) [6 pts] $\arcsin\left(\sin\left(\frac{9\pi}{8}\right)\right)$

(c) [8 pts] $g(x) = \sin(\arccos(x))$

6. [10 pts] An angry pirate is stranded on a desert island. He estimates that his parrot is 12 meters above the ground in a coconut tree. The pirate stands directly below the parrot and walks 15 meters away. What is the angle of elevation that the pirate should raise his musket to shoot his only friend? (Your answer should be in radians so that other pirates will understand your answer.)

7. [10 pts] The amplitude of one of the vibrating wires in a piano is

$$A(t) = 0.05 \cos \left(0.1 \frac{\sqrt{T}}{L} t \right),$$

where T is the tension in the wire (measured in Newtons), L is the length of the wire (meters), and t is the time. A piano maker wishes to make a wire that vibrates 500 cycles per second, and the length of the wire will be 0.9 meters. What tension will be required?

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: _____