

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: _____

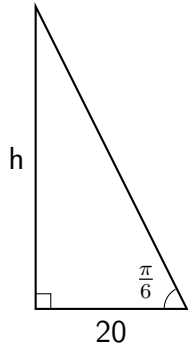
Problem Number	Points Possible	Points Made
1	20	
2	10	
3	15	
4	15	
5	10	
6	15	
7	15	
Total:	100	

- 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:

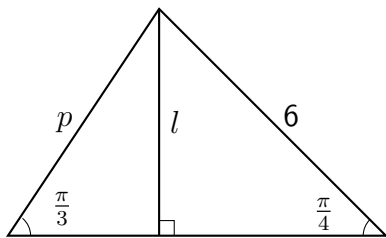
$$\begin{aligned}\cos(\alpha + \beta) &= \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta), \\ \sin(\alpha + \beta) &= \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta).\end{aligned}$$

1. Determine the values of the requested quantities in each question below. (All angles are given in radians.)

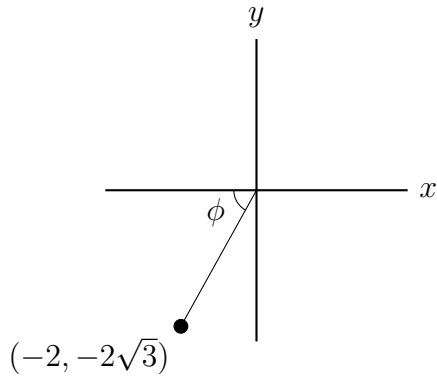
_____ (a) [5 pts] Determine the exact value of h in the figure below.



_____ (b) [5 pts] Determine the exact value of p in the figure below.

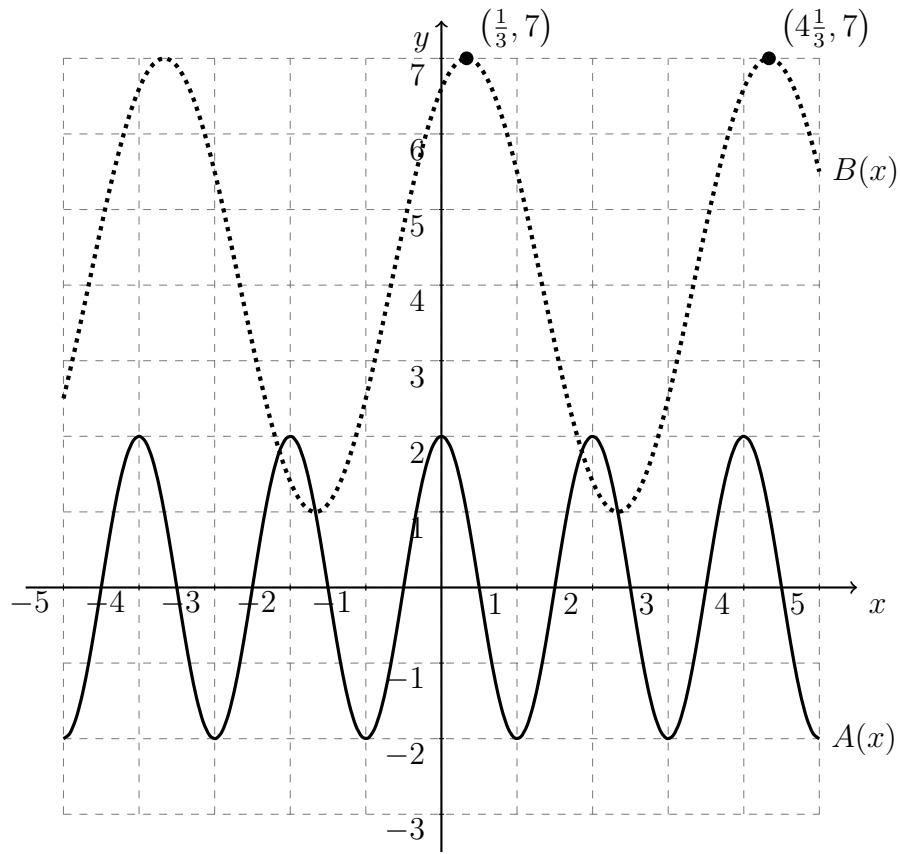


- (c) [5 pts] Determine the value of ϕ associated with the coordinate in the figure below. (Numerical answers should be to within 2 decimal digits.)



- (d) [5 pts] Determine the value of α where α is between $\frac{\pi}{2}$ and π and $\sin(\alpha) = \frac{1}{2}$. (Numerical answers should be to within 2 decimal digits.)

2. The graphs of two functions are given in the plot below.



_____ (a) [5 pts] Determine a formula for the function $A(x)$ expressed as a sine function.

(b) [5 pts] Determine a formula for the function $B(x)$ expressed as a cosine function.

3. Determine the exact values of each of the expressions below.

(a) [5 pts] $\cos(\arcsin(0.34))$

(b) [5 pts] $\sin(\arccos(0.6) + \arctan(3.1))$

(c) [5 pts] $\arcsin\left(\sin\left(\frac{7\pi}{6}\right)\right)$

4. A baker has been contacted to bake pies for a pie eating contest to celebrate π day. The pies will be sliced into sectors, and the angle for each sector will be 0.67 radians.

_____ (a) [7 pts] How many full slices can be cut from each whole pie? (Each pie will be made in the shape of a whole circle.)

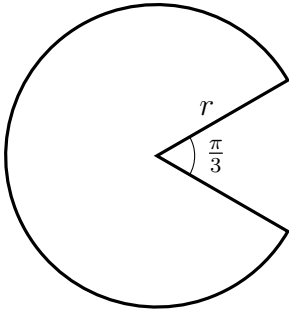
_____ (b) [8 pts] If the area of the top of each piece of pie must be 0.0075 m^2 what radius pie pan should be used to bake the pies?

5. [10 pts] Determine whether or not the following expression is an identity for all values of θ :

_____ $\tan(\theta) + \cot(\theta) = \sec(\theta) \csc(\theta).$

Show your work and justify your conclusions.

6. [15 pts] The author of a video game will construct a path that ghost characters will travel around within the game, and the shape is shown in the figure below. It consists of a circle with a sector removed on its right side. The angle of the missing sector will be $\frac{\pi}{3}$ radians, and the full length of the path, including the outside of the partial circle and the two radii, should be 4 meters. What should the radius of the circle be?



7. [15 pts] A train robber looks out from atop a tunnel entrance and looks at a train coming straight toward him. The vicious robber's perch is ten meters above the tracks. The horrible
_____ robber is looking at the tracks below the leading edge of the train, and the angle of depression is eight degrees. What is the train's horizontal distance from the nasty nasty robber?

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: _____