

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	0	
2	10	
3	15	
4	20	
5	20	
6	10	
7	10	
8	15	
Total:	100	

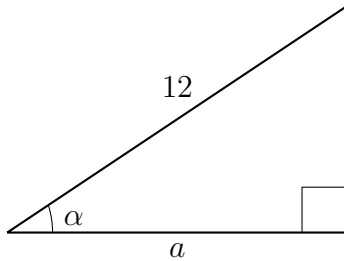
- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- If you make use of a theorem to justify a conclusion then state the theorem used by name.
- Your work must be **neat**. If I can't read it (or can't find it), I can't grade 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:

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

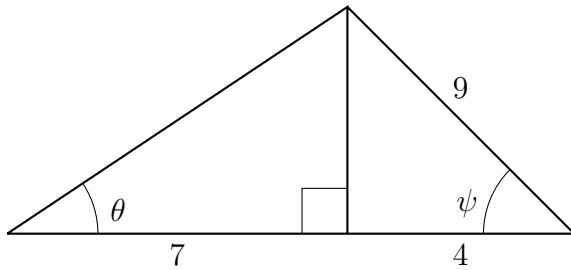
1. [2 Bonus] Common Knowledge: Will Cat Ferguson live up to all the hype?

2. Determine the values of the requested quantities in each question below. All values should be either exact or 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.)**

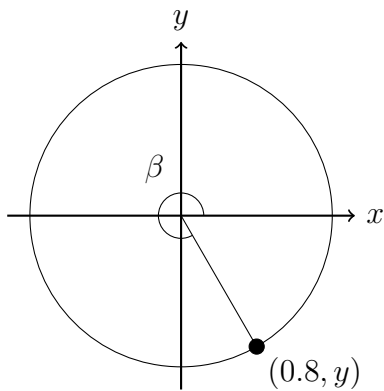
- (a) [5 pts] Given that  $\cos(\alpha) = 0.3$ , determine the sine, and tangent of the angle  $\alpha$  in the diagram below. Also, determine the value of  $a$ .



- (b) [5 pts] Determine the radian measure of the angle  $\theta$  in the diagram below.



3. Determine the values of the requested quantities in each question below. All values should be either exact or within 0.01 of the true value unless otherwise stated. (**All angles are given in radians and should be expressed in radians if you have to determine their value.**)
- (a) [5 pts] The circle in the diagram below has a radius of 2 units. Determine the values of the cosine, sine, and tangent of the angle  $\beta$ . (Provide an exact answer.)



- (b) [10 pts] A coordinate on the unit circle,  $P(-1/3, 2\sqrt{2}/3)$ , has a corresponding angle,  $\phi$ . Determine the values of  $\sin(\phi - \pi)$  and  $\cos(\phi + \pi)$ .

4. Determine the exact value of the following expressions. Your final answer should not include a trigonometric function. Show your work and leave your answer as an exact expression and not a numerical approximation from a calculator. Do not just write an answer but show each step and provide a brief justification when a function is evaluated.

(a) [10 pts]  $\arcsin\left(\sin\left(\frac{6\pi}{10}\right)\right)$

(b) [10 pts]  $\sin(\arccos(0.6))$ .

5. The questions below refer to the function

$$p(x) = 3 \sin(2x) + 1.$$

(a) [10 pts] For what values of  $x$  between 0 and  $2\pi$  is the function a maximum?

(b) [10 pts] For what values of  $x$  between 0 and  $2\pi$  is the function a minimum?

6. [10 pts] Verify the identity

$$\frac{\cos(\theta) + \sin(\theta)}{\sec(\theta) + \csc(\theta)} = \sin(\theta) \cos(\theta).$$

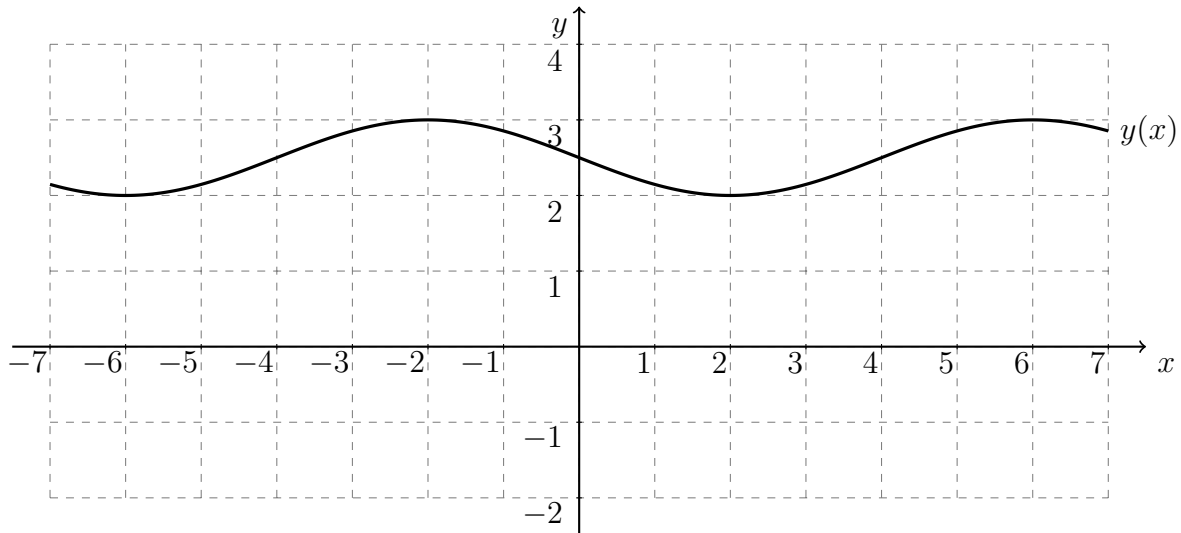
Show **every** step without skipping any operations. Your work must be legible and easy to follow from one step to the next.

7. [10 pts] Freddy Pharkas is sitting on the edge of the boarding house's roof next to Penelope Primm looking at the building that houses his pharmacy. The distance between the base of the hotel and the base of the pharmacy is 40 meters. Freddy looks at the top of the pharmacy's roof and measures an angle of depression of  $14^\circ$ , Freddy then looks at the base of the pharmacy and measures an angle of depression of  $37^\circ$ . Determine the height of the pharmacy and let Freddy know so he can brag to Penelope.

8. [15 pts] Express the function whose graph is shown below as a cosine function,

$$y(x) = A \cos(Bx + C) + D,$$

where  $A > 0$  and  $B > 0$ .



A=

B=

C=

D=



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: \_\_\_\_\_