

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	20	
4	15	
5	20	
6	10	
7	10	
8	15	
Total:	100	

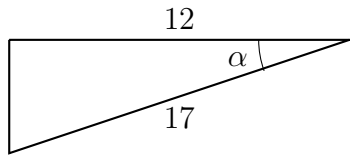
- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- If you make use of a theorem to justify a conclusion then state the theorem used by name.
- Your work must be **neat**. If I can't read it (or can't find it), I can't grade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

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

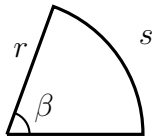
1. [2 Bonus] Common Knowledge: What will Rachele Barbieri have to do to help the sprint train of Team dsm-firmenich PostNL match that of Lidl-Trek?

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] Determine the sine, cosine, and tangent of the angle α in the diagram below.



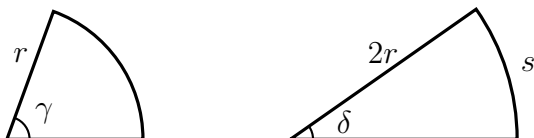
- (b) [5 pts] A sector has an angle of β radians, the arclength is $s = 4.5$, and the radius is $r = 3.1$. Determine the radian measure of the angle β .



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) [10 pts] A point on the unit circle is in the second quadrant, and its y -coordinate is 0.35. Determine the value of the x -coordinate of the point. (Provide an exact answer.)

(b) [10 pts] Two sectors are shown below. The angle δ in the sector on the left has a radian measure of 0.8. The area of the sector on the right is twice the area of the sector on the left. The radius of the sector on the right is twice the radius of the sector on the left. Determine the radian measure of the angle in the second sector, δ .



4. [15 pts] A rigid, straight board has a length of eight meters, and it is leaning against a wall. The bottom of the board is resting on the floor a distance of two meters from the base of the wall. What is the radian measure of the acute angle formed between the floor and the board? If the bottom of the board is slid out a distance of 0.1m will the angle increase or decrease? (Explain using the changes in trigonometric functions without making an explicit calculation.)

5. 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.

(a) [10 pts] $\cos(\arcsin(0.2))$

(b) [10 pts] $\tan(\arccos(x))$ (Your answer should be a function of x .)

6. [10 pts] Verify the identity

$$\frac{1 - \sin(\theta)}{\sec(\theta) - \tan(\theta)} = \cos(\theta).$$

Show every step without skipping any operations. Your work must be legible and easy to follow from one step to the next. Explicitly state the number of the step for each step.

7. [10 pts] A trigonometric function is defined to be

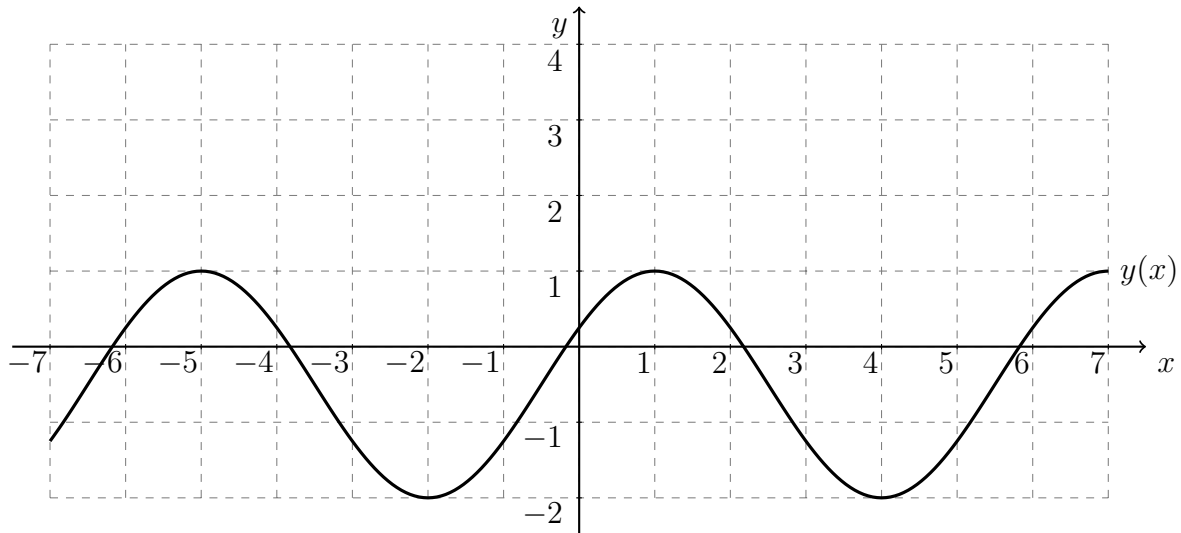
$$h(x) = 3 \sin(2x).$$

Determine all intervals within $[0, 2\pi]$ where the function is decreasing.

8. [15 pts] Express the function whose graph is shown below as a sine 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: _____