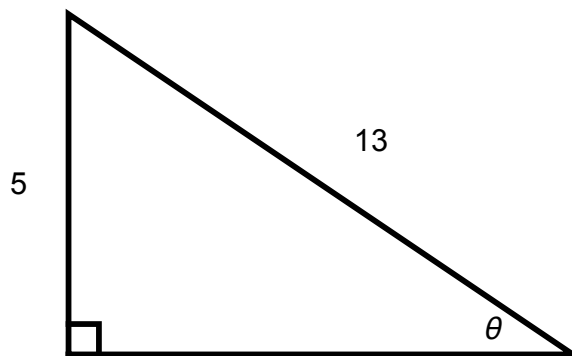


Show all your work for full credit. Unsupported work = reduced points. Unless otherwise stated, round answer to two decimal places.

- 1) Given the triangle below, find the six trigonometric functions of  $\theta$ . Don't solve for  $\theta$  and give exact values.



$\sin(\theta)$

\_\_\_\_\_

$\cos(\theta)$

\_\_\_\_\_

$\tan(\theta)$

\_\_\_\_\_

$\sec(\theta)$

\_\_\_\_\_

$\cot(\theta)$

\_\_\_\_\_

$\csc(\theta)$

\_\_\_\_\_

[ \_\_\_\_\_ /6]

- 2) If  $\cos(\theta) = \frac{2}{7}$  and  $\tan(\theta) < 0$ , find the exact value of  $\csc(\theta)$ .

[ \_\_\_\_\_ /5]

- 3) Write  $\sec(\theta) \cdot \tan(\theta)$  in terms of just  $\sin(\theta)$ .

[ \_\_\_\_\_ /5]

- 4) A circle of radius 6 is subtended by an angle of  $65^\circ$ . Find the length of the arc **and** the area of the sector.

[ \_\_\_\_\_ /5]

5) A mountain trail has an incline of  $8^\circ$  and goes from a cabin at an elevation of 9000 feet to a mountain lake at an elevation of 11,200 feet. Find the length of the trail.

[ /6]

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6) Solve the triangle with sides  $a = 22$ ,  $b = 13$ , and  $c = 16$ . Round values to two decimal places and summarize all angles and sides in a table.

[ /6]

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7) A tree is growing vertically on a straight slope that makes an angle of  $17^\circ$  with the horizontal. The tree casts a 23-foot shadow up the slope when the angle of elevation from the top of the tree to the sun is  $55^\circ$ . Find the height of the tree. Round to two decimal places.

[ /6]

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8) Two boats leave the same port at the same time. One travels at a speed of 15 mi/h in the direction  $N50^\circ E$  and the other travels at a speed of 8 mi/h in a direction  $S70^\circ E$ . How far apart are the two boats after one hour?

[ /6]

9) Crazy Jim is pushing a merry-go-round (see picture) with a diameter of 12-ft at a rate of one complete revolution every 2 seconds.

- Find the angular speed in radians/sec.
- A child standing on the edge jumps off the spinning merry-go-round. Find their linear speed in feet/sec.
- Convert the linear speed to miles per hour.



[ /6]

**Extra Credit** A circle with radius 6 intersects a circle of radius 4 so that the line of intersection of the two circles is 5. Find the area of the shaded region in the smaller circle.

