Algebra 2 Quarter 4 Exam **Name/Student Number:_____**

Answer the questions below. Make sure to show your work and justify all of your answers

Simplify the trigonometric expression**. Show your work.**

1.

$$\frac{1}{1+\sin\theta}+\frac{1}{1-\sin\theta}$$

2. In ΔABC, $\angle C$ is a right angle. Find the remaining sides and angles. Round your answers to the nearest tenth**. Show your work.**

$a = 3$, $c = 19$

3. Please show your work to find the mean and standard deviation of the data. Round to the nearest tenth.

20, 16, 18, 14, 9, 20, 16

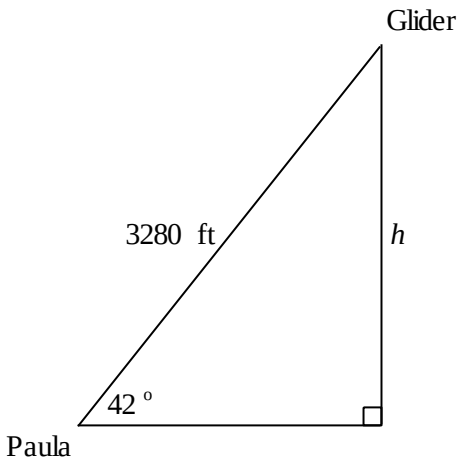
4. What are the points of discontinuity? Are they all removable? Please show your work.

$$y = \frac{(x-5)}{x^2-6x+5}$$

5. A sound wave is modeled with the equation $y = \frac{1}{4}\cos\frac{2\pi}{3}\theta$.

a. Find the period. **Explain your method.**
b. Find the amplitude. **Explain your method**.
c. What is the equation of the midline? **What does it represent**?

6. Paula spots a glider located at an angle of elevation of 42°. The distance between the glider and Paula is 3280 feet. To the nearest foot, what is the height of the glider *h* from the ground? **Show your work**.



7. **What is the product in simplest form? State any restrictions on the variable. Please show your work.**

$$\frac{y^2}{y-3} \cdot \frac{y^2 - y - 6}{y^2 + y}$$

Verify the identity. Justify each step.

8. $\tan\theta + \cot\theta = \dfrac{1}{\sin\theta\cos\theta}$

9. **Is there any bias in the survey question? Explain.**

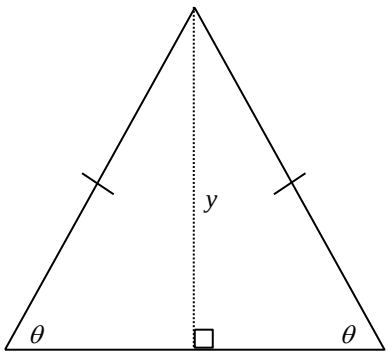
What do think would help students pay more attention in class?

10. **Find the values of the 30th and 90th percentiles of the data. Please show your work.**
129, 113, 200, 100, 105, 132, 100, 176, 146, 152

11. **What is the quotient in simplified form? State any restrictions on the variable. Show Work.**

$$\frac{a+2}{a-5} \div \frac{a+1}{a^2-8a+15}$$

12. Vance is designing a garden in the shape of an isosceles triangle. The base of the garden is 36 feet long. The function $y = 18 \tan \theta$ models the height of the triangular garden.



36 feet

not drawn to scale

a. What is the height of the triangle when $\theta = 45°$?
b. What is the height of the triangle when $\theta = 55°$?
c. Vance is considering using either $\theta = 45°$ or $\theta = 55°$ for his garden. Compare the areas of the two possible gardens. Explain how you found the areas.

13. **Verify the identity. <u>Justify each step.</u>**

$$\frac{\sec\theta}{\csc\theta - \cot\theta} - \frac{\sec\theta}{\csc\theta + \cot\theta} = 2\csc\theta$$

14. **Compare the graphs of the inverse variations. Please provide at least 3 comparisons**

$y = \frac{-0.2}{x}$ and $y = \frac{-0.3}{x}$

15. Use a graphing calculator to solve the equation $-3\cos t = 1$ in the interval from $0 \le \theta \le 2\pi$. Round to the nearest hundredth.

16. The equation models the height *h* in centimeters after *t* seconds of a weight attached to the end of a spring that has been stretched and then released.

$$h = 7\cos\left(\frac{\pi}{3}t\right)$$

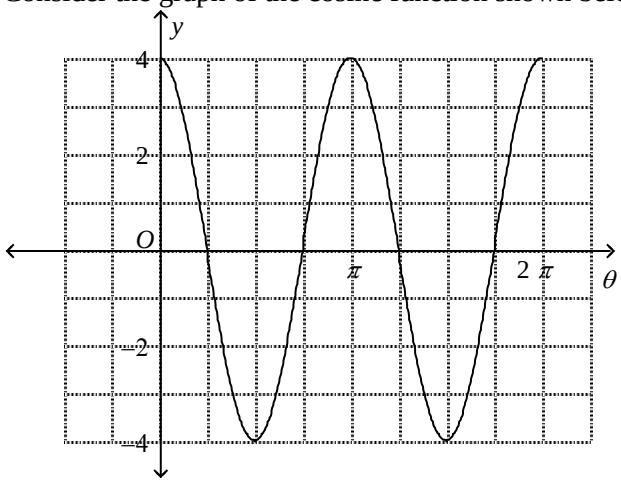
a. Solve the equation for *t*.

b. Find the times at which the weight is first at a height of 1 cm, of 3 cm, and of 5 cm above the rest position. Round your answers to the nearest hundredth.

c. Find the times at which the weight is at a height of 1 cm, of 3 cm, and of 5 cm below the rest position for the second time. Round your answers to the nearest hundredth.

17.

Consider the graph of the cosine function shown below.

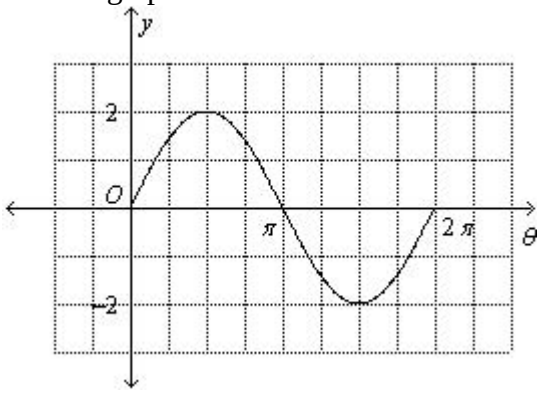


a. Find the period and amplitude of the cosine function.

b. At what values of θ for $0 \leq \theta \leq 2\pi$ do the maximum value(s), minimum values(s), and zeros occur?

18.

Use the graph of the sine function $y = 2 \sin \theta$ shown below.



a. How many cycles occur in the graph?
b. Find the period of the graph.
c. Find the amplitude of the graph.

19. Verify the Pythagorean Identity.

$1 + \cot^2 \theta = \csc^2 \theta$

20.
Howard is flying a kite and wants to find its angle of elevation. The string on the kite is 32 meters long and the kite is level with the top of a building that he knows is 28 meters high.
To the nearest tenth of a degree, find the angle of elevation. **Show your work**.