

Please follow directions and put your work and answers in the space provided. No work, no credit. NO GRAPHING calculators are allowed. GOOD LUCK!!!!

1. Given $f(x) = \frac{2x^2 - x - 3}{x^2 - 1}$, find the following if they exist. If one or more do not exist

state the reason why:

- a. Vertical Asymptotes: _____
- b. Horizontal Asymptote: _____
- c. Slant Asymptote: _____
- d. x-values for which there is a hole in the graph: _____

3. Solve the following inequalities:

a. $x^3 + x^2 - 4x - 4 \geq 0$ Answer in interval notation: _____

(HINT: Factor by grouping)

b. $\frac{x^2 - x - 2}{x^2 + 5x + 6} \leq 0$ Answer in interval notation: _____

4. Given $f(x) = \frac{2}{5}x + 1$, find $f^{-1}(x)$ and verify that that the two functions are indeed inverses of one another: $f^{-1}(x) = \underline{\hspace{2cm}}$

5. Sketch a graph of $f(x) = 1 - e^x$. What is the domain and range of $f(x)$?

Sketch: Domain: Range:

6. Solve the following exponential and logarithmic equations:

a. $e^{-x} = 5^{2x}$ $x = \underline{\hspace{2cm}}$ b. $1000e^{-.03x} = 5000$ $x = \underline{\hspace{2cm}}$

c. $\log x - \log(x + 3) = -1$ $x = \underline{\hspace{2cm}}$ d. $2\ln x - \ln 5 = \ln(x + 10)$ $x = \underline{\hspace{2cm}}$

7. For a science fair project, a group of students tested different materials used to construct kites. Their instructor provided the students with an instrument that accurately measures the angle of elevation. In one of the tests, the angle of elevation was 63.4 degrees with 670 feet of kite string out. Assuming the string was taut, how high was the kite? Height _____

8. Given that the $\sin \theta = -\frac{1}{3}$ and that θ is in quadrant III. Find the other five trigonometric function values. Give exact values (In other words, no decimal approximations with your calculator):

$$\begin{aligned}\sin \theta &= \underline{\hspace{2cm}} & \csc \theta &= \underline{\hspace{2cm}} \\ \cos \theta &= \underline{\hspace{2cm}} & \sec \theta &= \underline{\hspace{2cm}} \\ \tan \theta &= \underline{\hspace{2cm}} & \cot \theta &= \underline{\hspace{2cm}}\end{aligned}$$

9. Find the reference angle and the exact function value if it exists, also state the quadrant that the angle's terminal side is in or the axis that the terminal side is on: (Exact means no decimal approximations, in other words do not use your calculators)

- a. $\sin 330^\circ = \underline{\hspace{2cm}}$ reference angle: $\underline{\hspace{2cm}}$ Quadrant: $\underline{\hspace{2cm}}$
- b. $\tan 240^\circ = \underline{\hspace{2cm}}$ reference angle: $\underline{\hspace{2cm}}$ Quadrant: $\underline{\hspace{2cm}}$
- c. $\sec 450^\circ = \underline{\hspace{2cm}}$ reference angle: $\underline{\hspace{2cm}}$ Quadrant: $\underline{\hspace{2cm}}$
- d. $\cos 135^\circ = \underline{\hspace{2cm}}$ reference angle: $\underline{\hspace{2cm}}$ Quadrant: $\underline{\hspace{2cm}}$

10. Convert the following degree measures to radian measures. Leave the answer in terms of π .

a. $210^\circ =$ _____

b. $315^\circ =$ _____

c. $45^\circ =$ _____

d. $120^\circ =$ _____

11. Convert the following radian measures into degrees:

a. $\frac{\pi}{3} =$ _____

b. $\frac{\pi}{6} =$ _____

c. $\frac{3\pi}{2} =$ _____

d. $\frac{11\pi}{6} =$ _____