Student: ____________ **Date:** ____________	**Instructor:** Jonathon Peterson **Course:** MA 16100 - Plane Analytic Geometry and Calculus I (coordinator)	**Assignment:** Midterm Exam 1

1. Find all vertical asymptotes of the given function.

$$f(x) = \frac{-x^2+16}{x^2+5x+4}$$

- **A.** $x = -1$
- **B.** $x = -1, x = 4$
- **C.** $x = 1, x = -4$
- **D.** $x = -1, x = -4$

2. Find $\lim\limits_{x \to 2} \frac{x+5}{x^2+8x+15}$.

$\lim\limits_{x \to 2} \frac{x+5}{x^2+8x+15} =$ ____________

*3. Find the limit.

$$\lim_{x \to 4} \frac{24x-6x^2}{2-\sqrt{x}}$$

$\lim\limits_{x \to 4} \frac{24x-6x^2}{2-\sqrt{x}} =$ ____________

(Type an integer or a simplified fraction.)

4. Write the trigonometric expression as an algebraic expression in u.

$$\sin\left(\csc^{-1} u\right)$$

$\sin\left(\csc^{-1} u\right) =$ ____________ (Type an exact answer, using radicals as needed.)

5. Determine if the following function has a slant asymptote, and if so compute the slant asymptote.

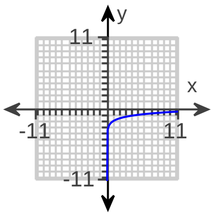
$$f(x) = \frac{x^3-1}{x^2-5x+5}$$

- **A.** The slant asymptote is $y = mx + b$ with $m =$ ____________ and $b =$ ____________
- **B.** There is no slant asymptote

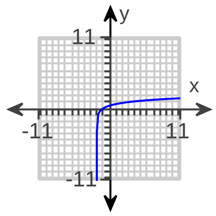
6. Graph the function.

$y = \log_5(x-2)$

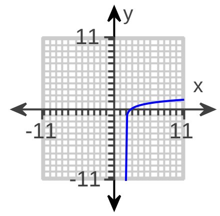
A.



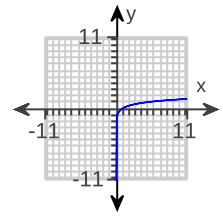
B.



C.



D.



7. Analyze the following limit.

$$\lim_{x \to 1^-} \frac{x^4 \cos(\pi x)}{\ln(x)}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. $\lim_{x \to 1^-} \frac{x^4 \cos(\pi x)}{\ln(x)} =$ __________

B. The limit does not exist and is neither ∞ nor $-\infty$.

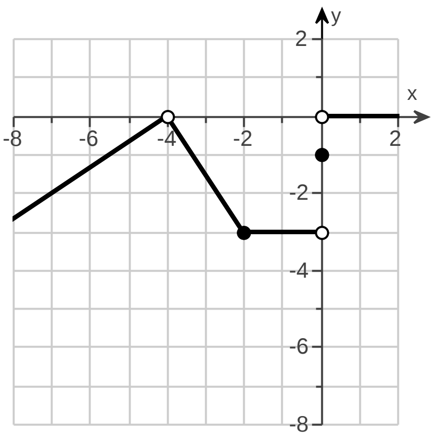
8. Determine the value of the constant a for which the function f(x) is continuous at -4.

$$f(x) = \begin{cases} \frac{x^2+6x+8}{x+4} & \text{if } x \neq -4 \\ a & \text{if } x = -4 \end{cases}$$

The function f(x) is continuous at -4 when a = __________. (Type an integer or a fraction.)

*9. For the function g(x) graphed here, find the following limits or state that they do not exist.

a. $\lim_{x\to -4} g(x)$ **b.** $\lim_{x\to -2} g(x)$ **c.** $\lim_{x\to 0} g(x)$ **d.** $\lim_{x\to -0.8} g(x)$



a. What is $\lim_{x\to -4} g(x)$? Choose the correct answer below and, if necessary, fill in the answer box to complete your choice.

- **A.** $\lim_{x\to -4} g(x) =$ ______
- **B.** $\lim_{x\to -4} g(x)$ does not exist

b. What is $\lim_{x\to -2} g(x)$? Choose the correct answer below and, if necessary, fill in the answer box to complete your choice.

- **A.** $\lim_{x\to -2} g(x) =$ ______
- **B.** $\lim_{x\to -2} g(x)$ does not exist

c. What is $\lim_{x\to 0} g(x)$? Choose the correct answer below and, if necessary, fill in the answer box to complete your choice.

- **A.** $\lim_{x\to 0} g(x) =$ ______
- **B.** $\lim_{x\to 0} g(x)$ does not exist

d. What is $\lim_{x\to -0.8} g(x)$? Choose the correct answer below and, if necessary, fill in the answer box to complete your choice.

- **A.** $\lim_{x\to -0.8} g(x) =$ ______
- **B.** $\lim_{x\to -0.8} g(x)$ does not exist

10. Solve for all angles θ where $0 \le \theta \le 2\pi$.

$$\sin 2\theta + 2\cos^2\theta = 0$$

$\theta =$ ______

(Use a comma to separate answers as needed. Type an exact answer in terms of π.)

11. Consider the function $f(x) = \frac{9e^{x} + 4e^{-x}}{e^{x} - 4e^{-x}}$. Use various limits to find the asymptotes.

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a) Compute $\lim_{x \to \infty} f(x) =$ ____________

b) Compute $\lim_{x \to -\infty} f(x) =$ ____________

c) Determine the vertical asymptote(s). Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

- **A.** The function has one vertical asymptote, $x =$ ____________.
- **B.** The function has two vertical asymptotes. The leftmost asymptote is $x =$ ____________, and the rightmost asymptote is $x =$ ____________.
- **C.** The function has no vertical asymptotes.