Mr. Rivera **Summer Assignment - Calculus** **Pages 1-6**

Short Answer

1. **Determine whether the sequence converges or diverges. If it converges, find its limit.**

   $\{a_n\} = \left\{5 + \frac{5}{n}\right\}$

2. **Find the first five terms in the sequence of partial sums for the series.**

   $\sum_{k=1}^{\infty} k^4$

3. **Find the real solutions of the equation.**

   $x^3 + 8x^2 + 19x + 12 = 0$

4. **Find a bound on the real zeros of the polynomial function.**

   $f(x) = x^4 - 8x^2 - 9$

5. **Form a polynomial f(x) with real coefficients having the given degree and zeros.**

   Degree: 4; zeros: 1, -1, and 4 - 2i

6. **Suppose that ln 2 = a and ln 5 = b. Use properties of logarithms to write each logarithm in terms of a and b.**

   $\ln \sqrt[8]{40}$

7. **Express y as a function of x. The constant C is a positive number.**

   $3\ln y = \frac{1}{3}\ln x - \ln \frac{x^2 - 1}{x^{4/3}} + \ln C$

8. **Solve the equation.**

   $\log (4x) = \log 5 + \log (x - 4)$

9. **Solve the equation.**

   $\log_9(5x + 7) = \log_9(5x + 3)$

10. **Find the exact value of the expression.**

    $\sin\left(\cos^{-1} \frac{1}{2} - \sin^{-1} \frac{\sqrt{3}}{2}\right)$

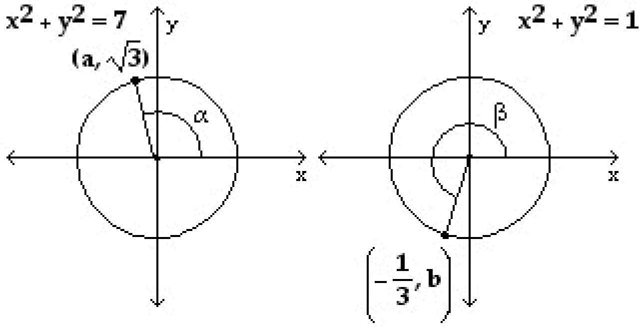
11. **Write the trigonometric expression as an algebraic expression containing u and v.**

    $\cos(\sin^{-1} u - \cos^{-1} v)$

12. **Write the trigonometric expression as an algebraic expression containing u and v.**

$\cos(\tan^{-1} u + \tan^{-1} v)$

13. **Use the figures to evaluate the function given that f(x) = sin x, g(x) = cos x, and h(x) = tan x.**



$f(2\alpha)$

14. **Find the exact value of the expression.**

$\tan\left[2\cos^{-1}\left(-\frac{4}{5}\right)\right]$

15. **Solve the equation on the ionterval** $0 \le \theta < 2\pi$

$2\cos\theta + 3 = 2$

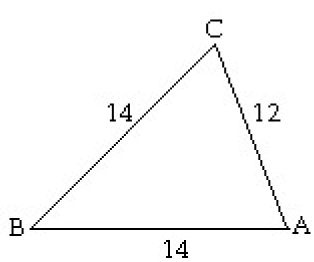
16. **Solve the equation on the ionterval** $0 \le \theta < 2\pi$

$\sin^2\theta = 5(\cos\theta + 1)$

17. **Identify the conic that the polar equation represents. Also, give the position of the directrix.**

$r = \frac{9}{1 - 3\cos\theta}$

18. **Find the area of the triangle. If necessary, round the answer to two decimal places.**



19. **Solve the system of equations by substitution.**

$$\begin{cases} x + y = 0 \\ 2x + 3y = -7 \end{cases}$$

20. **Solve the system of equations by substitution.**

$$\begin{cases} 3x + y = 13 \\ 2x - 7y = 24 \end{cases}$$

21. **Solve the system of equations by elimination.**

$$\begin{cases} 5x - 2y = -1 \\ x + 4y = 35 \end{cases}$$

22. **Solve the system of equations by elimination.**

$$\begin{cases} x + y = -2 \\ x - y = 16 \end{cases}$$

23. **Solve the system of equations by elimination.**

$$\begin{cases} 6x + 3y = 51 \\ 2x - 6y = 38 \end{cases}$$

24. **Solve the system of equations.**

$$\begin{cases} 7x + 7y + z = 1 \\ x + 8y + 8z = 8 \\ 9x + y + 9z = 9 \end{cases}$$

25. **Solve the system. [Let u = $\frac{1}{x}$ and v = $\frac{1}{y}$, and solve for u and v. Then let x = $\frac{1}{u}$, and y = $\frac{1}{v}$.]**

$$\begin{cases} \frac{2}{x} + \frac{4}{y} = 7 \\ \frac{1}{x} - \frac{2}{y} = 4 \end{cases}$$

26. **Solve the problem.**

Find the function $f(x) = ax^3 + bx^2 + cx + d$ for which $f(0) = -2$, $f(1) = 5$, $f(-1) = 3$, $f(2) = 4$.

27. **Find the limit algebraically.**

$$\lim_{x \to -2} (-2x + 8)$$

28. **Find the limit algebraically.**

$$\lim_{x \to 0} (x - \sqrt{5})(x + \sqrt{5})$$

29. **Find the limit algebraically.**

$$\lim_{x \to 0} (x^2 - 5)$$

30. **Find the limit algebraically.**

$$\lim_{x \to 1} \frac{2x - 7}{4x + 5}$$

31. **Find the limit algebraically.**

$$\lim_{x \to 1} \frac{x^4 - 1}{x - 1}$$

32. **Find the limit algebraically.**

$$\lim_{x \to 6} \frac{x + 6}{(x - 6)^2}$$

33. **Find the limit algebraically.**

$$\lim_{x \to -4} \frac{x^2 - 16}{x + 4}$$

34. **Find the limit algebraically.**

$$\lim_{x \to 1} \frac{x^3 + 5x^2 + 3x - 9}{x - 1}$$

35. **Find the limit algebraically.**

$$\lim_{x \to 0} \frac{7\tan x}{9x}$$

36. **Find the limit as x approaches c of the average rate of change of the function from c to x.**

$c = 3$; $f(x) = 3x^2 + 39x$

37. **Find the limit as x approaches c of the average rate of change of the function from c to x.**

$c = -3$; $f(x) = 2x^2 - 4$

38. **Find the limit as x approaches c of the average rate of change of the function from c to x.**

c = -4; $f(x) = x^3$

39. **Find the limit as x approaches c of the average rate of change of the function from c to x.**

c = -5; $f(x) = \frac{2}{x}$

40. **Find the value for the function.**

Find f(x + h) when $f(x) = -2x^2 - 5x + 5$.

41. **Find the value for the function.**

Find f(x + h) when $f(x) = \frac{8x + 5}{3x + 2}$.

42. **Find and simplify the difference quotient of f, $\frac{f(x + h) - f(x)}{h}, h \neq 0$, for the function.**

$f(x) = x^2 + 7x + 8$

43. **Find and simplify the difference quotient of f, $\frac{f(x + h) - f(x)}{h}, h \neq 0$, for the function.**

$f(x) = \frac{1}{2x}$

44. **Find the slope of the tangent line to the graph at the given point.**

$f(x) = x^2 + 5x$ at (4, 36)

45. **Find the slope of the tangent line to the graph at the given point.**

$f(x) = -4x^2 + 7x$ at (5, -65)

46. **Find the average rate of change for the function between the given values.**

$f(x) = -3x^2 - x$; from 5 to 6

47. **For the function, find the average rate of change of f from 1 to x:** $\frac{f(x) - f(1)}{x - 1}, x \neq 1$

f(x) = -2x

48. **Find and simplify the difference quotient $\frac{f(x + h) - f(x)}{h}, h \neq 0$ for the given function.**

$f(x) = x^2 + 3x + 9$

49. **Solve the problem.**

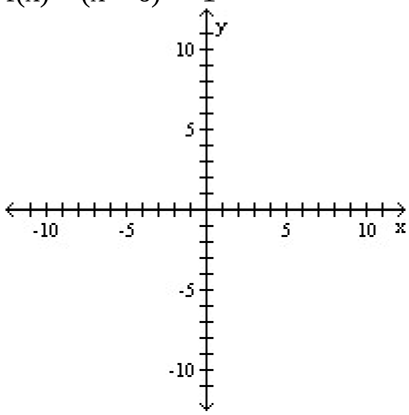
Find real numbers a, b, and c such that the graph of the function $y = ax^2 + bx + c$ contains the points $(1, 1)$, (2, 4), and (-3, 29).

50. **Solve the problem.**

Find real numbers a, b, and c such that the graph of the function $y = ax^2 + bx + c$ contains the points $(1, 2)$, $(2, 11)$, and $(-3, -14)$.

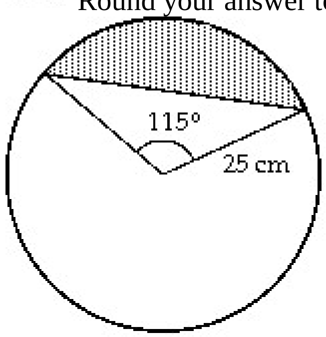
51. **Graph the function by starting with the graph of the basic function and then using the techniques of shifting, compressing, stretching, and/or reflecting.**

$f(x) = (x + 6)^3 + 1$



52. **Solve the problem.**

Find the area of the shaded portion (see illustration) of a circle of radius 25 cm, formed by a central angle of $115°$. Round your answer to the nearest square cm.



[Hint: Subtract the area of the triangle from the area of the sector of the circle to obtain the area of the shaded portion.]