Final Exam

Cumulative Review: Functions through Sequences, Series & Probability

Name: _____ Date: _____ Score: _____ / 16

INSTRUCTIONS

This final exam cumulatively covers Units 1 through 11 (Foundations of Functions through Sequences, Series, and Probability). For multiple-choice questions, circle the letter of the correct answer. For short-answer and problem-solving questions, show your complete work in the space provided. No calculator unless your teacher says otherwise.

1 **Unit 1 — If f(x) = 4x − 1, find $f^{-1}(x)$.** Multiple Choice

A $f^{-1}(x) = (x + 1)/4$

B $f^{-1}(x) = (x - 1)/4$

C $f^{-1}(x) = 4x + 1$

D $f^{-1}(x) = 4(x + 1)$

2 **Unit 2 — Find the slope-intercept equation of the line through (0, −3) and (2, 5).** Multiple Choice

A $y = 4x - 3$

B $y = 4x + 3$

C $y = -4x - 3$

D $y = 4x - 5$

3 **Unit 3 — Find all real zeros of $f(x) = x^2 - x - 6$.** Multiple Choice

A −2, 3

B 2, −3

C 1, −6

D −2, −3

4 **Unit 3 — Short Answer: Find the vertical asymptote(s) of $f(x) = (x + 2)/(x^2 - 4)$. (Hint: check for a common factor first.)** Short Answer

5 **Unit 4 — Solve for x: $3^x = 81$** Multiple Choice

A 4

B 3

C 27

D 9

6 **Unit 4 — Short Answer: Expand using log properties: $\log(xy^2)$** Short Answer

7 **Unit 5 — Find the exact value: sin(60°)** Multiple Choice

A √3/2
B 1/2
C √2/2
D 1

8 **Unit 6 — Find the period of y = cos(3x).** Multiple Choice

A 2π/3
B 3π
C π/3
D 6π

9 **Unit 7 — Simplify: $1 - \sin^2(x)$** Multiple Choice

A $\cos^2(x)$
B $\sin^2(x)$
C 1
D $-\cos^2(x)$

10 **Unit 7 — Short Answer: Solve 2cos(x) − √3 = 0 for x in [0, 2π).** Short Answer

11 **Unit 8 — Find the magnitude of the vector (5, 12).** Multiple Choice

A 13
B 17
C 60
D 7

12 **Unit 9 — Solve the system: x + y = 10 and x − y = 2.** Multiple Choice

A (6, 4)
B (4, 6)
C (5, 5)
D (8, 2)

13 **Unit 9 — Short Answer: Find the determinant of [[2, 3], [1, 4]].** Short Answer

14 **Unit 10 — Identify the conic represented by $9x^2 + 4y^2 = 36$.** Multiple Choice

A Ellipse
B Circle
C Hyperbola
D Parabola

15 **Unit 10 — Short Answer: Convert $x^2 + y^2 + 2x - 4y - 4 = 0$ to standard form by completing the square, then state the center and radius.** Short Answer

16 **Unit 11 — Problem Solving: A geometric sequence has first term 2 and common ratio 3. Find the 6th term and the sum of the first 5 terms. Show your work.** Problem Solving