

MATH 116
FINAL EXAM

BLAKE FARMAN
UNIVERSITY OF SOUTH CAROLINA

Answer the questions in the spaces provided on the question sheets and turn them in at the end of the class period. If you require extra space, use the back of the page and indicate that you have done so.

Unless otherwise stated, all supporting work is required. Unsupported or otherwise mysterious answers will **not receive credit**. You may *not* use any calculators.

Name: _____

Problem	Points Earned	Points Possible
1		10
2		10
3		10
4		10
5		10
6		10
7		10
8		10
9		10
10		10
Total		100

Date: December 8, 2015.

1 (10 Points). *Find the period, frequency, and amplitude of $y = 2 \cos(2x) + 2$, then graph one period.*

2 (10 Points). *Graph the function $f(x) = x^2 - 2x - 3$. Label the x -intercepts, y -intercept, and the vertex.*

3 (10 Points). Let $f(x) = x^2 - 9$ and $g(x) = \sqrt{x}$.

(a) Compute $(f \circ g)(x)$.

(b) Compute $(g \circ f)(x)$.

4 (10 Points). *Find all the solutions (real and complex) to the equation*

$$x^4 - 8x = 0.$$

5 (10 Points). *Show that*

$$\tan(\sec^{-1}(x)) = \sqrt{x^2 - 1}.$$

6 (10 Points). Consider the polynomial $p(x) = x^3 - x^2 - 9x + 9$. Observe that

$$p(1) = 1 - 1 - 9 + 9 = 0.$$

Use this information to factor $p(x)$ completely.

7 (10 Points). *Use the identity*

$$\sin(\theta - \phi) = \sin(\theta) \cos(\phi) - \sin(\phi) \cos(\theta)$$

to show that

$$\sin\left(\frac{\pi}{4}\right) = \cos\left(\frac{\pi}{4}\right).$$

Hint: $\frac{1}{4} = \frac{1}{2} - \frac{1}{4}$.

8 (10 Points). *Simplify*

$$\frac{x + \sqrt{2}}{x^2 - 2}$$

by rationalizing the numerator.

9 (10 Points). *Determine whether $f(x) = 3^{2x+1}$ is invertible. If it is, then compute the inverse. Otherwise, explain why it does not have an inverse.*

10 (10 Points). *Solve the following equations for x .*

(a)

$$\log_2(x^2 - 9) - \log_2(x - 3) = 3$$

(b)

$$2^{x^2} = \frac{16^x}{16}$$