Name:

SIDN:

Math 32 Final Exam

Please read the following before beginning the exam

a. There are 11 problems on the exam. All problems are worth 5 points.

b. No calculators, notes or books are allowed to be out during the exam other than your cheat sheet. If you are caught with said items your exam will be confiscated. If your cell phone rings you are not to answer it. If at any point during the exam you touch your cell phone, look at your cell phone, or I see your cell phone you will receive a 0/50 on the exam.

c. The exam starts at 8:10am and ends at 10:00am. Do not open the exam until instructed to do so.

d. If you have any questions about any of the problems raise your hand and wait for assistance.

e. Please be clear about your final answer, if it is unclear what your answer is points will be deducted.

1. Prove the identity
$$\frac{\cos(12x)}{\sin(4x)} + \frac{\sin(12x)}{\cos(4x)} = 2\cot(8x).$$

2. Solve
$$2\cos^2 x = \sqrt{3} + 2\sin^2 x$$
for $0 \leq x < 2\pi$.

3. Solve the following system of equations

$$5x + 5y - 4z = 3$$
$$4x + 4y - 3z = 3$$
$$3x + 2y - 2z = 1$$

4. Find all real solutions to the equation

$$x - \sqrt{28 - x} + 2 = 0.$$

5. Prove

$$\sec^{10} x - 5\sec^8 x \tan^2 x + 10\sec^6 x \tan^4 x - 10\sec^4 x \tan^6 x + 5\sec^2 x \tan^8 x - \tan^{10} x = 1.$$

6. Find the point on the curve $f(x) = \sqrt{2x+4}$ closest to the point $(17,0)$.

7. Let $f(x) = x^7 - 16x^6 + 57x^5 - 30x^4 + 92x^3 - 50x^2 + 67x + 170$. Compute $f(11)$.

8. Let $f(x) = 2 - \ln(x) + \ln(x + 1)$. Compute $f^{-1}(x)$.

9. Graph two periods of $f(x) = 2 - 2\cos(\pi x - \pi)$. Make sure to label your x and y-axis appropriately. This should include nine points on the x-axis and at least one relevant point on the y-axis to give the appropriate scale.

10. **Lightning Round** (1 point each)

    a. Compute $\log_8 16$.

    b. Which is larger, $\log_4 10$ or $\log_{1/4} 10$?

    c. Compute $\sin(\tan^{-1}(x/2))$.

    d. Which of the six trig functions are negative in the third quadrant?

    e. True or False: The solution to $|2x - 8| \geq 10$ is $[-1, 9]$.

11. **Lightning Round Part Deux** (1 point each)

    a. How many of the six trig functions are symmetric about the origin?

    b. What is the radius of the circle defined by the equation $x^2 - 6x + y^2 + 8y = 0$?

    c. What is the coefficient of $x^4 y^7$ in the expansion of $(x + y)^{11}$?

    d. What is the range of $\ln x$?

    e. True or False: $\ln(e^{x^2} + e^x) = x^2 + x$.