**MATH 25** **PRACTICE FINAL** **October 5, 2016**

**Name:** _____ **Score:** _____ / 100

**Student ID:** _____

**DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ✓ | | | | | | | | | | | 27 |
| **Score** | | | | | | | | | | | |
| **Pts. Possible** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 29 |

**INSTRUCTIONS FOR STUDENTS**

- Questions are on both sides of the paper. This is an 10 question exam.
- Students have 2 hours and 15 minutes to complete the exam.
- The test will be out of **27 points**. The highest possible score will be **29 points**. You must complete 9 problems for credit (3 points each, 27 points total). If you wish, you can attempt a $10^{th}$ problem for extra credit. That question will be out of 2 points, for a maximum of 29 possible points.
- In the above table, the row with the ✓ should be marked for the 9 questions you want graded. Mark **EC** for the extra credit problem.
- You may complete parts of problems, as partial credit will be given based on correctness, completeness, and ideas that are leading to the correct solutions.
- **PLEASE SHOW ALL WORK**. Any unjustified claims will receive no credit. Clearly box your final answer.
- No notes, textbooks, phones, calculators, etc. are allowed for the exam.
- The back of the test can be used for scratch work.

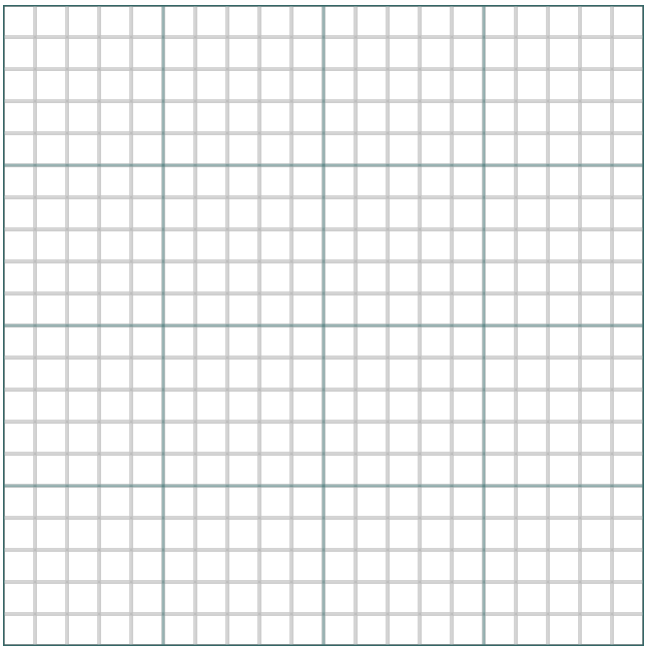
GOOD LUCK!

**FORMULAS:**

| Name | Formula |
|---|---|
| Foci for ellipse | $c^2 = a^2 - b^2, a > b$ |
| Foci for hyperbola | $c^2 = a^2 + b^2$ |
| $n^{th}$ term of Arithmetic Series | $a_n = a_1 + (n-1)d$ |
| Sum of Arithmetic Series | $S_n = \frac{n}{2}(a_1 + a_n)$ |
| Finite Geometric Series | $\sum_{j=1}^{n} ar^{j-1} = \frac{a(1-r^n)}{1-r}$ |
| Infinite Geometric Series | $\sum_{j=1}^{\infty} ar^{j-1} = \frac{a}{1-r}$ |
| Binomial coefficients | $\binom{n}{r} = \frac{n!}{r!\cdot(n-r)!}$ |
| Binomial Theorem | $(a+b)^n = \sum_{r=0}^{n} \binom{n}{r} a^{n-r}b^r$ |

1) Graph the following function. Clearly label all asymptotes and the $x$ and $y$-intercepts.

$$f(x) = -4^{x+1} - 2$$



2) (a) Solve the following logarithmic equation for $x$:

$$\log_3(y) + \log_3(y+6) = 3$$

(b) Solve following exponential equation for $x$:

$$5^{3x-8} = 25^{2x}$$

3) Solve the following system of equations.

$$\begin{cases} -2x & +5y & -4z & = & -4 \\ x & -2y & +z & = & 3 \\ x & -5y & +9z & = & -5 \end{cases}$$

4) Write an equation for the ellipse having foci at (0, 1) and (8,1) , a $x$-vertices at (-1, 1), and (9, 1).

5) Write the following equation for the ellipse in standard form. Then identify the values for $h, k, a, b$.

$$3x^2 + 2y^2 - 30x - 4y + 59 = 0$$

6) (a) Find the general term in the sequence:

$$\{a_n\} = \frac{2}{2}, -\frac{5}{4}, \frac{8}{8}, -\frac{11}{16}, \frac{14}{32}, -\frac{17}{64}, \frac{20}{128}, \dots$$

(b) Find the following sum using the general term found in part (a):

$$\sum_{n=1}^{4} \{a_n\}$$

7) Consider the sequence $\{a_j\} = \{1, 6, 11, 16, 21, ....\}$.

a) Identify the type of sequence $\{a_j\}$.
b) What is the value of the term $a_{100}$?
c) Find the sum of the first 50 terms.

8) Use induction to prove:

$$2 + 6 + 10 + ... + (4n - 2) = 2n^2 \quad \text{for positive integers } n \geq 1$$

9) Use the binomial theorem to expand $(2x + 3y)^5$

10) Find the $8^{th}$ term in the expansion of $(2a + b^4)^{10}$.

**THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK**

**END OF TEST**