Part I
Multiple Choice Questions

Do not open this booklet until told to do so. You may write inside the booklet, and circle your answer choices. When finished, place scratch paper in the booklet and return to instructor

Student Name: _________________________

Student ID #: _________________________

Instructor Name: _______________________

Section Number: _______________________

Multiple Choice Score ____________ Free Response Score ____________

Total Score ____________
1. Simplify: \( \sqrt[3]{\frac{1}{9y}} \)

   a) \( \frac{\sqrt{y}}{3y} \)  
   b) \( \frac{\sqrt[3]{9y}}{9y} \)  
   c) \( \frac{\sqrt[3]{y^2}}{3y} \)  
   d) \( \frac{\sqrt[3]{3y^2}}{3y} \)

2. Solve:

   \[ \frac{9y}{3y+9} + \frac{3y-11}{2y+6} = \frac{5y-2}{y+3} \]

   a) \( y = -7 \)  
   b) No solution  
   c) \( y = \frac{23}{24} \)  
   d) \( y = \frac{1}{9} \)

3. Multiply and simplify:

   \( (4\sqrt{6} - 2\sqrt{7})(\sqrt{6} - 4\sqrt{7}) \)

   a) 80  
   b) \(-18\sqrt{42} + 25\)  
   c) \(-18\sqrt{42} + 80\)  
   d) \(5\sqrt{6} - 6\sqrt{7}\)
4. The slope of the line that is perpendicular to the line through the pair of points \((-3, -2)\) and \((2, 9)\) is:

a) \(\frac{11}{5}\)  
b) \(-\frac{5}{11}\)  
c) \(-7\)  
d) \(\frac{1}{7}\)

5. Given \(f(x) = \sqrt{4-x}\) find \(f(-5) = \)

a) Not a real number  
b) \(2\sqrt{5}\)  
c) \(3\)  
d) \(\pm 3\)

6. Simplify the given expression. Write the answer with positive exponents. Assume that all variables represent positive numbers.

\[
\frac{\left(3a^{\frac{1}{5}}\right)^4}{a^{\frac{1}{20}}}
\]

a) \(12a^{\frac{105}{4}}\)  
b) \(81a^{16}\)  
c) \(3a^{\frac{3}{5}}\)  
d) \(81a^{\frac{3}{4}}\)
7. The inverse of the function \( f(x) = 5x - 7 \) is:

a) \( f^{-1}(x) = 5x + 7 \)  
\( b) f^{-1}(x) = \frac{x + 7}{5} \)  
\( c) f^{-1}(x) = \frac{x + 7}{5x - 7} \)  
\( d) f^{-1}(x) = \frac{1}{5x - 7} \)

8. Multiply: \( \sqrt{-5} \cdot \sqrt{-15} \)

a) \( 5\sqrt{5} \)  
\( b) 5i\sqrt{3} \)  
\( c) 5\sqrt{3} \)  
\( d) -5\sqrt{3} \)

9. The solutions of \( x^4 - 9x^2 + 20 = 0 \) are:

a) \( \pm 5, \pm 2 \)  
\( b) \pm \sqrt{5}, \pm 2 \)  
\( c) 4, 5 \)  
\( d) 0, \pm 3 \)
10. The domain of the given graphed function is:

![Graph]

a) $[-6, 2]$  
 b) $(-\infty, \infty)$  
 c) $[-7, \infty)$  
 d) $[-10, 10]$

11. Solve: $3^{2x} = 7$

a) $x = \frac{\log 7}{2 \log 3}$  
 b) $x = \frac{7}{6}$  
 c) $x = \frac{\log 7}{\log 3}$  
 d) $x = \frac{7}{9}$

12. The sum of three numbers is 60. One number is five more than a second number. It is also twice the third. Find the numbers.

a) 15, 20, 30  
 b) 10, 20, 30  
 c) 26, 21, 13  
 d) 17, 19, 24
13. Divide. Write answer in the form \(a + bi\). \(\frac{1+i}{3-i}\)

a) \(-\frac{2}{3}\)  
b) \(-\frac{1}{3}\)  
c) \(\frac{1}{4} + \frac{1}{2}i\)  
d) \(\frac{1}{5} + \frac{2}{5}i\)

14. Factor: \(27a^3 - 64\)

a) \((3a - 4)(3a^2 + 12a + 16)\)  
b) \((3a - 4)(9a^2 - 12a + 16)\)  
c) \((3a - 4)^3\)  
d) \((3a - 4)(9a^2 + 12a + 16)\)

15. The interval notation for the solution set of \(|x - 2| \leq 5\) is:

a) \([-5, 5]\)  
b) \([-3, 7]\)  
c) \([-7, 7]\)  
d) \((-\infty, -7] \cup [7, \infty)\)
16. Which of the following graphs might be that of $y = 3^x + 2$?

a) ![Graph a)

b) ![Graph b)

c) ![Graph c)

d) ![Graph d)

17. The interval notation for the solution set of $x^2 + 8x + 15 \geq 0$ is:

a) $(-\infty, -5] \cup [-3, \infty)$

b) $[-5, -3]$

c) $(-\infty, -3]$

d) $[-5, \infty)$
18. The graph of \( f(x) = -|x+4|+3 \) is:

a) \[ \hspace{1cm} \]

b) \[ \hspace{1cm} \]

c) \[ \hspace{1cm} \]

d) \[ \hspace{1cm} \]

19. If the longer leg of a right triangle is 12 feet more than the shorter leg and the hypotenuse is 12 feet less than twice the shorter leg, then the length of the shorter leg is:

a) 48 b) 36 c) 60 d) Not possible
20. The graph of \( \frac{x^2}{4} - \frac{y^2}{25} = 1 \) is:

a) 

b) 

c) 

d)
L. A. Mission College
Math 125 Sample
Common Final Examination

Part II
Free Response Questions

Write in the space provided. When finished, place scratch paper in the booklet and return to instructor.

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Section Number: _______________________

Multiple Choice Score ______ Free Response Score ______

Total Score ______
Math 125 Common Final Examination
Print Name: -----------------------------

PART II FREE RESPONSE QUESTIONS

Instructions:
(a) Do ALL given problems.
(b) Work must be shown in a clear and logical manner to obtain credit.
(c) Remember: No work = No credit!
(d) Write all your work in the space provided and box your answer when appropriate.

1) If \( f(x) = x^2 + 3 \) and \( g(x) = 2x - 3 \)

(a) (2 pts.) Find \((f - g)(x)\) and simplify completely.

(b) (3 pts.) Find \((f \circ g)(x)\) and simplify completely.

2) (5 pts.) Solve: \( \log_6 x + \log_6(x - 1) = 1 \)
3) (5 pts.) Solve: \(3^{4x - 2} = 81\)

4) (5 pts.) Graph the solution set for the system of inequalities:

\[
\begin{align*}
&y \geq 2x + 1 \\
&\frac{x^2}{4} + \frac{y^2}{9} \leq 1
\end{align*}
\]
5) (5 pts.) The height of a cannon ball, measured in feet, is a function of time. It is given by 
\[ f(t) = 96t - 16t^2 \] where \( t \) is the time in seconds. Find the highest point reached by the cannon ball.

6) (5 pts.) Find the center and radius of the circle and graph it: 
\[ x^2 + y^2 + 2x - 6y - 15 = 0 \]
7) Given the quadratic function: \( f(x) = (x - 3)^2 + 5 \)

(a) (1 pt.) State its vertex.

(b) (1 pt.) Give the equation of the axis of symmetry.

(c) (3 pts.) Graph the function \( f(x) = (x - 3)^2 + 5 \).

8) (5 pts.) How long will it take for a $500 investment to double if it is invested at 6% annual interest compounded continuously? (Use the formula \( A = Pe^{rt} \), and round your answer to the nearest tenth.)