

Concurrent Enrollment College Algebra
CE Math 1050

Sample Final Examination 1

Sections 1.6, 3.1 -3.5, 4.3 - 4.5, 5.1 - 5.6, R. 6, 6.1, 6.2 - 6.8, 12.2 - 12.6, 13.1 - 13.3,
13.5

Name: _____

Scientific (not graphing) calculators are allowed. Time limit is 2 hours.

The point value of each problem is in the left-hand margin. **You must show your work to receive any credit, except on problems 1 & 2.** Work neatly.

(6 points) 1. True or false.

() $\log_3 \frac{x^2 + y}{z} = 2 \log_3 x + \log_3 y - \log_3 z$ for all $x > 0$, $y > 0$, and $z > 0$.

() The graphs of $f(x) = x^2$ is symmetric about x -axis.

() The solution of the inequality $|x - 1| \leq 2$ is $[-1, 3]$.

(9 points) 2. Fill in the blank.

(a) $\begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 2 & -1 \end{bmatrix} =$

(b) The solution of $3^{2x} = \sqrt[3]{3}$ is $x =$

(c) If $f(x) = 3x + 1$, then its inverse $f^{-1}(x) =$

(10 points) 3. Solve the inequality. Write your answer in interval notation. $\frac{2x-1}{x+2} \leq 1$.

(15 points) 4. Consider the rational function $f(x) = \frac{x^2}{x+1}$.

(a) State its domain.

(b) Find all intercepts of its graph, if any.

(c) Find all asymptotes of its graph.

(d) Determine whether its graph crosses a non-vertical asymptote. **Justify your answer.**

(e) Use the above information and other appropriate points to draw its graph.

(10 points) 5. Find the partial fraction decomposition of the rational expression.

$$\frac{3x}{(x+2)(x-1)}$$

(10 points) 6. Find a_8 of the geometric sequence given that $a_3 = 0.5$ and $a_4 = 8$.

(10 points) 7. (a) Evaluate the determinant of the matrix $A = \begin{bmatrix} 0 & -1 & 4 \\ 2 & 1 & -1 \\ 2 & -2 & 0 \end{bmatrix}$.

(b) How does the determinant of the matrix A will change if we add the first row to the second one and replace it: $\begin{bmatrix} 0 & -1 & 4 \\ 2 & 0 & 3 \\ 2 & -2 & 0 \end{bmatrix}$?

(10 points) 8. Solve the equation: $\ln(x - 3) + \ln(x - 2) = \ln(2x + 24)$.

(10 points) 9. A radioactive isotope has a half-life of 16 days. What is its relative rate of decay k ? ($m(t) = m_0e^{kt}$.) **Round only your final answer to two decimal places.**

(10 points) 10. Use the Binomial Theorem to determine which term of the expansion $(2x^3 - 1)^7$ contains x^6 , find the term, and simplify it.

(10 points) 11. Solve the system of nonlinear equations:
$$\begin{cases} x + y = -3 \\ x^2 + y^2 = 17 \end{cases}$$

(10 points) 12. Let $f(x) = \frac{1}{x}$ and $g(x) = \frac{1}{x+1}$.

(a) Find the composition $(f \circ g)(x)$ and simplify it.

(b) Determine the domain of the function $(f \circ g)(x)$ and state the answer in the set notation.

(10 points) 13. Let $f(x) = \log_2(x - 1) + 1$.

(a) Determine the domain.

(b) Find all intercepts of its graph.

(c) Find all asymptotes of its graph.

(d) Graph the function $f(x)$ using transformations. Start with graphing $g(x) = \log_2 x$ and show all steps.