College Algebra Math 1050
Practice Final Exam 2

Name:_____

School:_____ Instructor:_____

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** Work neatly.

_____

Fill in the blank or circle the correct answer.

1. (2 points) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} -1 & -1 \\ -1 & -1 \end{bmatrix} = $ _____

2. (2 points) The solutions of the equation $|x + 1| = 3$ are _____

3. (3 points) Nancy has $3000 invested in a bank which offers 5% interest compounded monthly. She will have $4000 on her account in _____ years. **Round your answer to a nearest tenth of a year**.

4. (3 points) The exponential form of the logarithmic equation $\log_3 x = 5$ is_____

5. (3 points) Let $\log_a x = 3, \log_a y = 4,$ and $\log_a z = 1 \log_a y = 4$. Then $\log_a \dfrac{x^2}{z^3 \sqrt{y}}$ is_____

Consider a function $f(x) = \dfrac{x - 4}{x^2 - 3x + 2}$.

6. (3 points) The domain of the function $f(x)$ is_____.

7. (3 points) The $x -$ intercept(s) of the function $f(x)$ are _____. Write your answers as ordered pairs.

8. (3 points) The $y -$intercept(s) of the function $f(x)$ are _____. Write your answers as ordered pairs.

Consider a function $g(x) = \dfrac{x^2}{x+1}$.

9. (3 points) The vertical asymptote(s), if any, of the function $g(x)$ is (are) _____ Write your answer as an equation.

10. (3 points) The non-vertical asymptote(s), if any, of the function $g(x)$ is (are) _____ Write your answer as an equation.

11. (3 points) The augmented matrix of the system of linear equations $\begin{cases} x - 2y + z = 9 \\ y + z = 0 \\ x + 3z = 2 \end{cases}$ is

_____

12. (3 points) Calculate $\begin{pmatrix} 10 \\ 7 \end{pmatrix} = $_____

13. (3 points) The inverse of the function $f(x) = \dfrac{2x-1}{x+1}$ is $f^{-1}(x) = \dfrac{x+1}{2-x}$. The range of f is_____

14. (3 points) f is a one-to-one function: $f = \{(-3,5),(-2,9),(-1,2),(0,11),(2,3)\}$. Find $f^{-1}(2)$_____

15. (3 points) Let $f(x) = x^3$. Which of the following is(are) the inverse of the function f? Circle your answer(s).
(a) $g(x) = \dfrac{1}{x^3}$
(b) $g(x) = x^{1/3}$
(c) $g(x) = \sqrt[3]{x}$
(d) $g(x) = x^{-3}$

16. (3 points) Given the table

x	−3	−2	−1	0	1	2	3
$f(x)$	−7	−5	−3	−1	3	5	7
$g(x)$	8	3	0	−1	0	3	8

evaluate $(f \circ g)(1)$.

2

17. (3 points) Consider the equation $\log_2(3x - 1) - \log_2 x = 1$.
(a) Giorgi's first step to solve the equation is: $\log_2 \frac{3x - 1}{x} = 1$.
(b) Lado's first step to solve the equation is: $\log_2(3x - 1 - x) = 1$.
(c) The both are correct steps.
(d) None is a correct step.
Circle all that apply.

18. (3 points) The graph of the function $f(x) = -3x^6 + 4x^5 - x^2 + 7$ has at most _____ turning points.

19. (3 points) Let $a_1 = 2$ and $a_n = 1 - a_{n-1}$. Then a_3 is_____.
20. (3 points) Consider the equation $40 = 30e^{5x}$.
(a) Dato's first step to solve the equation is: $10 = e^{5x}$.
(b) Vaja's first step to solve the equation is: $\frac{4}{3} = e^{5x}$.
(c) Maka's first step to solve the equation is: $\ln 40 = 5x \ln 30$
(d) All are correct steps.
(e) None is a correct step.
Circle all that apply.

21. (3 points) Laticia wants to triple her initial investments of P dollars invested in a bank which offers 7% interest compounded continuously. Set up an equation which enables her to calculate for how long will it take:_____

22. (4 points) The form of the partial fraction decomposition of the rational function
$f(x) = \frac{x + 3}{x^2(x + 2)}$ is_____

23. (4 points) The matrix $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ -1 & 0 & -4 & 3 \\ 2 & 2 & 1 & -1 \end{bmatrix}$ is given. Some row operation(s) have

been applied to A to obtain $\begin{bmatrix} 1 & 2 & 3 & 4 \\ -1 & 0 & -4 & 3 \\ 0 & -2 & \_ & \_ \end{bmatrix}$. Fill the missing entries.

24. (4 points) The remainder of the division $\frac{3x^2 - x + 5}{x - 2}$ is _____

25. (4 points) Consider the inequality $\frac{x - 1}{x + 1} \geq 2$. Which correctly describes the first step in solving the inequality:
(a) Levan's first step to solve the inequality is: $x - 1 \geq 2(x + 1)$.
(b) Ladi's first step to solve the inequality is: $\frac{x - 1}{x + 1} - 2 \geq 0$.

(c) Both are correct steps.
(d) None is a correct step.
Circle all that apply.

26. (4 points) The rational expression $\dfrac{x^2 + 2x - 15}{x - 1}$ has critical numbers at $x = -5$, $x = 3$, and $x = 1$. Find the solution of the inequality $\dfrac{x^2 + 2x - 15}{x - 1} \leq 0$. Write the solution in interval form _____

27. (4 points) Consider the inequality $|x + 1| - 2 < 5$. Which correctly describes the first step in solving the inequality:
(a) Elene's first step to solve the inequality is: $|x + 1| < 7$.
(b) Keti's first step to solve the inequality is: $-5 < x + 1 - 2 < 5$.
(c) Masho's first step to solve the inequality is: $-5 > x + 1 - 2 > 5$.
(d) All are correct steps.
(e) None is a correct step.
Circle all that apply.

28. (4 points) If a ball is thrown directly upward with a velocity of $30 ft/\sec$, its height (in feet) after t seconds is given by $h(t) = 30t - 16t^2$. After how many seconds does the ball reach the maximum height? **Write an exact answer**, **do not approximate**.

29. (9 points) Graph the rational function $f(x) = \dfrac{x^2}{x + 2}$. Your graph should clearly show and label all $x -$ and $y -$intercepts and asymptotes.

4

30. (7 points) Assume that the following sequence is arithmetic and find the sum using appropriate formulas: $4 + 7 + 10 + 13 + \ldots + 310$.

---

31. (7 points) Solve the following system of linear equations using matrices (row operations). **No points will be given if the solution is found through trial and error**.

$$\begin{cases} x + y + z = 3 \\ -x + z = -3 \\ 2x + 3y - z = 1 \end{cases}$$

5

32. (7 points) Solve the logarithmic equation: $\log_4(x + 3) + \log_4 x = 1$. **No points will be given if the solution is found by trial and error method**.

_____

33. (7 points) A certain type of bacteria, given a favorite growth medium, doubles in population every 5 hours. ($N(t) = N_0 e^{kt}$.)

(a) Given that there were 150 bacteria to start with, how many bacteria will there be in 48 hours?

(b) If the carrying capacity (the maximum size) of this bacteria in the natural environment can be only 100,000,000, is this exponential model an appropriate model for this population?

6

34. Consider the system of nonlinear equations: $\begin{cases} xy = -\dfrac{10}{9} \\ x + y = 1 \end{cases}$.

(a) (2 points) Estimate the real solutions by examining the graphs below. Write your estimates as ordered pairs.

(b) (5 points) Solve the system algebraically. Keep the solutions as fractions, not decimals. **No points will be given if the solution is found by trial and error method**.
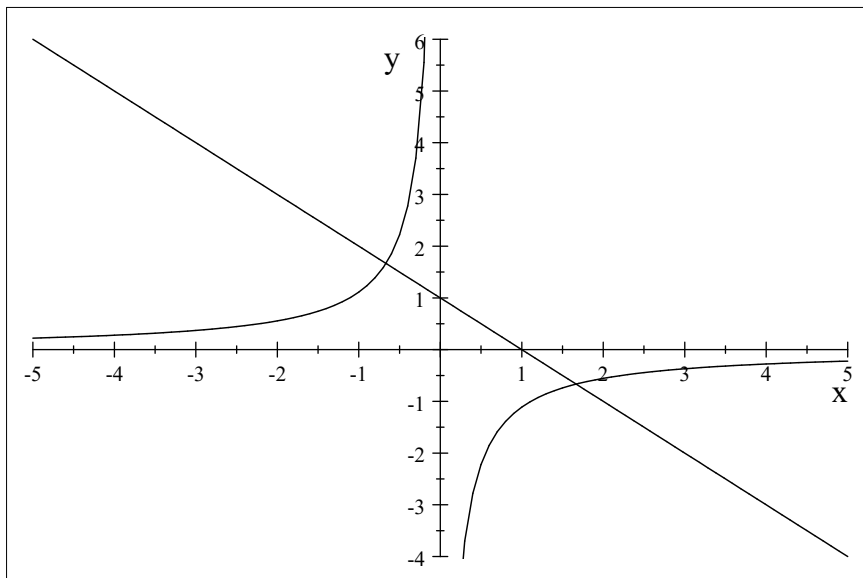
35. (5 points) Let $f(x) = \frac{3}{x} + 1$. Find the inverse of the function $f(x)$.

---

36. (8 points) Solve the inequality: $\frac{2x - 1}{x + 1} \geq 1$. Write the solution in interval notation.