College Algebra - Math 1050
Sample Final Exam - 8 pages
Time Limit: 2 Hours

NAME: _____

The point value of each problem is in the left-hand margin. You must show your work to receive any credit for your answers, except on problems 1-3. Work neatly.

(5) 1. True or False.

( ) (a) The value of ${}_7C_6$ is 7.

( ) (b) There are 25 ways of picking two different people from a group of 5 distinct people.

( ) (c) The solution set of the inequality $|x| > 1$ in interval notation is $(-\infty, -1)$.

( ) (d) The function $h(x)$ is an odd function if $h(-x) = h(x)$.

( ) (e) Functions $f(x) = x$ and $g(x) = \frac{1}{x}$ are inverses of one another.

(5) 2. Fill in the blanks.

(a) Simplifying $e^{\ln(1+x)}$ we get $e^{\ln(1+x)} =$ _____.

(b) The horizontal asymptote of the graph of $f(x) = \dfrac{x-2}{x+1}$ is the line _____.

(c) The next two terms in the sequence $1, -2, 4, -8, \cdots$ are _____ and _____.

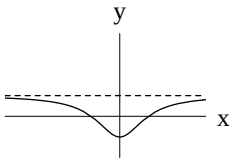
(d) Domain of the logarithmic function $f(x) = \log(1-x)$ is the interval _____.

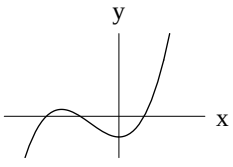
(e) The probability of picking a red ball from a collection of 5 red balls is _____.

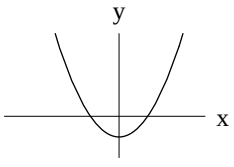
(4) 3. The graph of four of the following functions are shown below. Find the function corresponding to each graph.

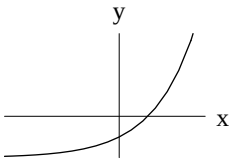
(a) $y = 2^x - 1$ (b) $y = -x^2 + 2x + 1$ (c) $y = \frac{1}{3}x^3 + x^2 - 1$ (d) $y = \frac{x^2+1}{x^2-1}$

(e) $y = \log(1-x)$ (f) $y = x^2 - 1$ (g) $y = \frac{x^2-1}{x^2+1}$ (h) $y = \log_2 x$









Graph of _____ ; Graph of _____ ; Graph of _____ ; Graph of _____

(4) 4. Solve $3|2x-1|+4<16$. Write the solution set in interval notation.

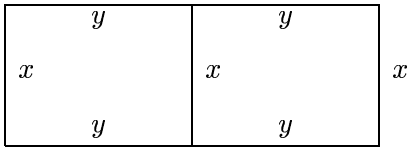
(6) 5. Solve the inequality $\dfrac{x-1}{(x-2)(x+3)}>0$. State your answer in interval notation.

(6) 6. How many different 4 letter words can be formed from 5 different letters if

(a) no repetition is allowed?

(b) repetition is allowed?

(5) 7. A rancher has 180 yards of fencing with which to construct a rectangular double corral as shown in the diagram.



What outside dimensions should be used to have the entire area be as large as possible? What is that maximum area?

(4) 8. Solve the equation $3^{x^2-1} = 9$.

(6) 9. Solve the equation $\log_2(x+3) + \log_2(x+1) = 3$.

(4) 10. Find the sum of the following series.

(a) $1 + 4 + 7 + 10 + \cdots + 61$

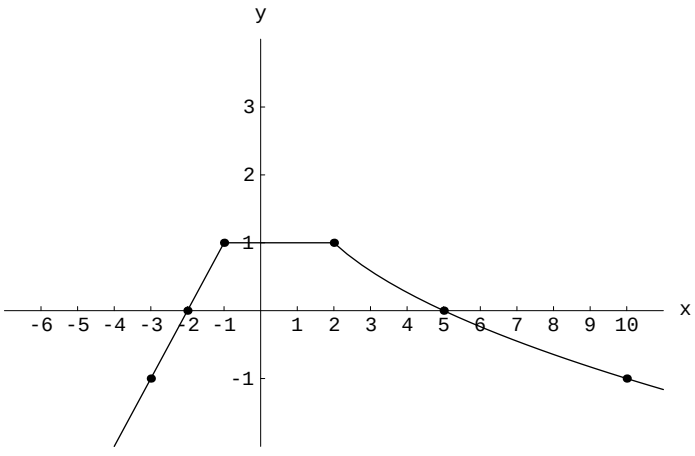
(b) $-3 + 1 - 1/3 + 1/9 - 1/27 + \cdots$

(5) 11. Given $f(x) = \sqrt{1-x}$ and $g(x) = x^2 - 1$. Find $(g \circ f)(x)$ and its domain.

(8) 12. Find all asymptotes (vertical, horizontal or oblique), x-intercepts and y-intercepts of the graph of the rational function $f(x) = \frac{(x-3)(x+2)}{x^2-1}$. Draw the graph of this function using at least 9 points.

(4) 13. Consider the graph of $y = f(x)$ shown below.

(a) State the intervals on which $y = f(x)$ is increasing, decreasing, or is constant.



(b) On the same coordinate system, draw the graph of $y = f(x+3) + 2$.

(5) 14. The inverse of the matrix $A = \begin{bmatrix} 10 & 5 & -7 \\ -5 & 1 & 4 \\ 3 & 2 & -2 \end{bmatrix}$ is $A^{-1} = \begin{bmatrix} -10 & -4 & 27 \\ 2 & 1 & -5 \\ -13 & -5 & 35 \end{bmatrix}$. Use this information to solve $\begin{cases} 10x + 5y - 7z = 1 \\ -5x + y + 4z = 3 \\ 3x + 2y - 2z = -2 \end{cases}$ by first converting it to a matrix equation.

(6) 15. List all possible rational zeros of the polynomial $p(x) = 2x^3 - 3x^2 + 2x - 3$ and then find all its zeros.

(4) 16. Find the inverse of the 1-1 function $f(x) = \sqrt[3]{x-1} + 1$.

(7) 17. Use mathematical induction to prove that $1^2+2^2+3^2+\cdots+n^2 = \dfrac{n(n+1)(2n+1)}{6}$ for $n = 1\,,\ 2\,, \cdots$.

(6) 18. What is the probability of getting a sum of 5 or a sum of 8, if two fair dice are rolled once?

(6) 19. For how long should \$10,000 be invested in an account paying 6.5% annual interest compounded monthly in order for its total value to grow to \$22,000 ?