Name:

College Algebra (Math 1023)
Practice Final Exam

Professor Paul Bailey
April 25, 2005

The final examination will be held on Thursday, May 14, at 3 pm. It will contain fifty problems with short answers. You will have two hours to complete the final exam.

This is a practice final. Try to time yourself when you first take it. Bring any questions to the attention of the class.

Problem 1. The slope of a line between the points $(3, -1)$ and $(7, 4)$ is _____.

Problem 2. Let $H(x) = 5^x$. Find $H(-3)$ and simplify: _____.

Problem 3. Let $f(x) = -2x + 7$ and $g(x) = ax + b$. Find $(f \circ g)(x)$ and simplify: _____.

Problem 4. Let $f(x) = \dfrac{2}{x}$. Find $\dfrac{f(x+h) - f(x)}{h}$ and simplify: _____.

Problem 5. Let $f(x) = x^4 - 6x^2 + 9$. Find all values of x for which f is increasing.

Use interval notation: _____.

Problem 6. Find an equation of a line perpendicular to $3x + 5y = 15$ and passing through $(-1, 3)$.

Write your answer in function form: _____.

Problem 7. The solution set of the equation $|x| = x$ is _____.

Problem 8. Let $f(x) = x^4 - 5x^3 + 2x^2 - 7x - 9$ and $g(x) = (x - 5)$.

Find the remainder when $f(x)$ is divided by $g(x)$: _____.

Problem 9. Solve $\dfrac{5x - 5}{x + 2} \geq 0$. Express the solution set in interval notation: _____.

Problem 10. Solve the system for x.

$$\begin{aligned} 2x + 4y + z &= 1 \\ x - 2y - 3z &= 2 \\ x + y - z &= -1 \end{aligned}$$

$x =$ _____.

Problem 11. Using 180 feet of fence, you build a rectangular pen which is twice as long as it is wide.

Find its area: _____.

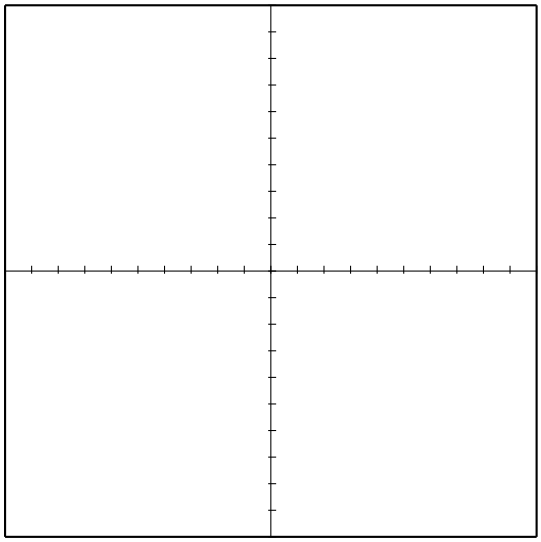
Problem 12. Let $g(x) = x^4 - 7x^3 + 12x^2 + 4x - 8$. Find $g(2)$ and use it to find a linear factor of $g(x)$.

$g(2) =$ _____ A linear factor of $g(x)$ is _____.

Problem 13. Let $V(h) = \frac{4\pi}{3}(15h - 7h^2 + h^3)$. Find $V(\frac{1}{2})$: _____.

Problem 14. Solve: $x^3 - 6x^2 - 13x + 42$. The solution set is _____.

Problem 15. Let $f(x) = e^{2-x}$. Graph $f(x)$.



Problem 16. Solve $\ln(2x + 5) - \ln(3) = \ln(3x - 1)$. The solution set is: _____.

Problem 17. Let $f(x) = -\log_5(2x)$. Is $f(x)$ increasing or decreasing? _____.

Problem 18. Solve: $x^3 - 3x^2 + 5x - 15 = 0$. The solution set is: _____.

Problem 19. Solve: $\dfrac{\log x}{\log 5} = \log x - \log 5$. The solution set is: _____.

Problem 20. Solve: $\ln(-x) \geq 0$. The solution set is: _____.

Problem 21. Let $f(x) = \begin{cases} 3x^2 & \text{if } x < 0; \\ 2x^3 & \text{if } x \geq 0. \end{cases}$

Evaluate $f(5) =$ _____ $f(-5) =$ _____.

Problem 22. Let $g(x) = \dfrac{x^3 - 15}{x^5 + 2x + 2}$. Does the graph of $g(x)$ have a horizontal asymptote? _____.

Problem 23. Let $a_1, a_2, \ldots, a_n$ be an arithmetic sequence and find the indicated quantity.

$a_1 = 5$, $a_{16} = 89$, $s_{16} =$ _____.

Problem 24. Let $a_1, a_2, \ldots, a_n$ be a geometric sequence and find the indicated quantity.

$a_1 = 21$, $a_2 = 7$, $a_6 =$ _____.

Problem 25. Find the value of the infinite geometric series.

$21 + 7 + \frac{7}{3} + \frac{7}{9} + \cdots =$ _____.

Problem 26. The y-intercept of the line going through the points $(7, 2)$ and $(5, 4)$ is _____.

Problem 27. Solve the system of linear equations.

$$\begin{aligned} 2x + 3y &= -3 \\ -x + 6y &= 5 \end{aligned}$$

$(x, y) =$ _____.

Problem 28. Solve: $4(x+2) - 5(x-3) > 5$. Express the solution set in interval notation: _____.

Problem 29. Solve: $x^2 + 3x - 18 < 0$. Express the solution set in interval notation: _____.

Problem 30. The graph of the function $f(x) = x^5 + 2x$ is symmetric about

(a) the x-axis;

(b) the y-axis;

(c) the origin;

(d) none of the above.

Problem 31. Let $f(x) = \dfrac{x^2 + 1}{x^3 - 2x^2 - 3x + 6}$. Find the domain of f: _____.

Problem 32. Find a polynomial of minimal degree with real coefficients with zeros 3 and $2i$.

Express $f(x)$ in standard form: _____.

Problem 33. Let $a_1, a_2, \ldots, a_n$ be an arithmetic sequence, and find the indicated quantity.

$a_1 = 5$, $d = \dfrac{2}{3}$, $a_{50} =$ _____.

Problem 34. If $\log_b(81) = L$, then $\log_b(\frac{1}{3}) =$ _____.

Problem 35. You invest two thousand dollars at six percent annual interest compounded monthly.

At the end of five years your investment will be worth: _____.

Problem 36. Evaluate: $\log_7 311 =$ _____.

Problem 37. A certain element decays with a half-life of 54 years.
If you are given 40 grams of this element, how much will you have in 12 years? _____

Problem 38. Evaluate: $\sum_{n=3}^{5}(3n^2 - 2n) =$ _____.

Problem 39. Solve: $5^{2x+3} = \frac{1}{25}$. The solution set is: _____.

Problem 40. Find the equation of the line through $(4, 3)$ with slope $m = -\frac{1}{3}$: _____.

Problem 41. Solve: $|ax + b| = |cx + d|$. The solution set is: _____.

Problem 42. Solve: $|\frac{3x-2}{4}| \leq 7$. The solution set is: _____.

Problem 43. Find a cubic polynomial $f(x)$ is zeros -1, 2, and 5, such that $f(3) = 4$.

Problem 44. Solve the system of equations for y.

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

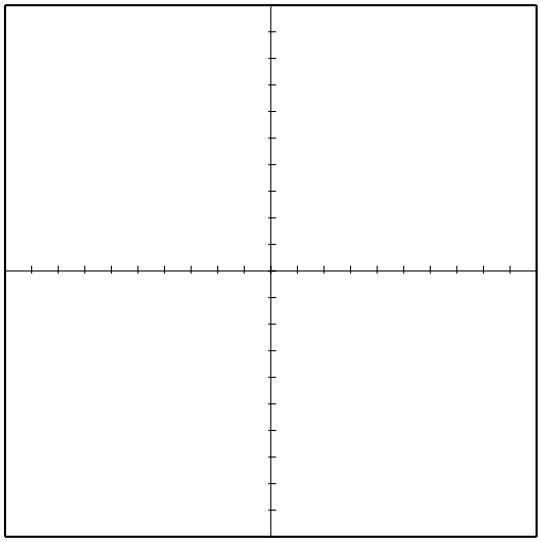
$y =$ _____.

Problem 45. Find the vertical asymptote of $f(x) = \dfrac{2x^2 - 1}{3x + 5}$: _____.

Problem 46. Let $f(x) = 3x + 2$ and $g(x) = x^2 - 5$. Find $(f \circ g)(x)$: _____.

Problem 47. Let $f(x) = 3x + 2$. Find $f^{-1}(x)$: _____.

Problem 48. Graph $g(x) = \dfrac{x^2}{x^2 - 9}$ and label all intercepts and asymptotes.



Problem 49. Let $a_1, a_2, a_3, \ldots$ be a geometric sequence. Find the indicated quantity.

$a_1 = 4$, $a_8 = 284$, $r =$ _____.

Problem 50. Let $h(x) = x^{17} + 8$. Find the remainder when $h(x)$ is divided by $(x + 1)$: _____.