Name:

College Algebra (Math 1023)
Practice Final Exam

Professor Paul Bailey
August 19, 2005

The final examination will be held on Thursday, Dec 15, at 3 pm. This exam is produced by the mathematics department, to be given to all traditional college algebra classes, and closely resembles the IMME computer generated final.

This is a practice final, and is designed to be similar to the actual final. You may save it until the last week of class and time yourself, or you may attempt the problems on the exam related to our current topic as the class progresses, and 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: _____.

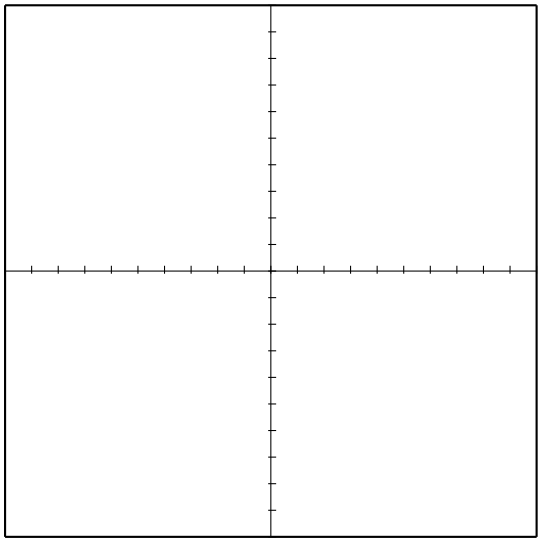
Problem 12. Let $g(x) = x^4 - 7x^3 + 12x^2 + 4x - 8$. Find $g(2)$ and use it to find a linear factor of $g(x)$.

$g(2) =$ _____ 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.

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

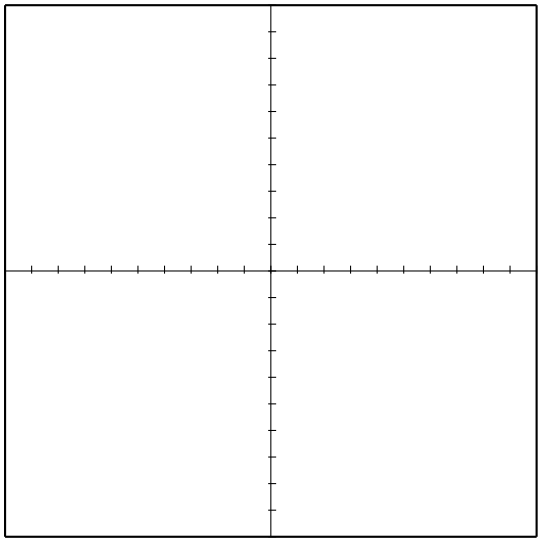
$y =$ _____.

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 $(x + 1)$: _____.