

Mathematics 114 Spring 2007 – Problem Sheet

1. Find the equation of the line which has a slope of 4, and passes through the point $(1, 3)$.
2. Solve $x^2 - 4x + 12 = 0$.
3. Find the domain of $f(x) = \frac{1}{x+2}$.
4. Find the horizontal and vertical asymptotes of $f(x) = \frac{3x^2 - 2}{x^2 - 3}$.
5. Let $N(t)$ be the number of bacteria in a culture at time t . In words, what do $N(4)$ and $N^{-1}(1000)$ mean?
6. Compute $\ln e + e^0$.
7. Find the equation of the line which has a slope of $-1/2$ and passes through the point $(2, 5)$.
8. Let $f(x) = x^2 + 2x + 1$ and $g(x) = \sqrt{x+7}$. Find $f \circ g$.
9. Solve $x^2 + 7x + 4 = 0$.
10. Solve $x^4 - x^2 - 2 = 0$.
11. Compute $\ln e^2 + \log_3 27$.
12. Find the domain of $f(x) = \sqrt{2-x}$.
13. Sketch the graph of $f(x) = \begin{cases} 2x, & x < 1 \\ 7, & x \geq 1 \end{cases}$
14. Find the horizontal and vertical asymptotes of $f(x) = \frac{x}{x^2 + 1}$.
15. Find the equation of the line which passes through the points $(2, 3)$ and $(4, 5)$.
16. Find the equation of the line which passes through the points $(2, 3)$ and $(6, 3)$.
17. Find the equation of the line which passes through the points $(2, 3)$ and $(2, 7)$.
18. Find the zeros of $f(x) = 4x^3 - 12x^2$.
19. Find the inverse of $f(x) = 2x + 5$.
20. Find the domain of $f(x) = \sqrt{x-5} + \frac{1}{x^2-9}$.
21. Solve the equation $x^4 - 3x^3 = 0$.
22. Solve the equation $x^6 + 5x^4 + 5x^3 = 0$.
23. Solve the equation $x^2(x-1) - x^3(x-1)^2 = 0$.
24. Let $f(x) = 3x - 2x^4$ and $g(x) = \sqrt{x-1}$. Find $f(2)$, $f(x+h)$, and $f \circ g$.
25. Find the inverse of $f(x) = 1 - x^3$.
26. Find the equation of the line which is perpendicular to the line $y = 2x + 3$ and passes through the point $(1, 2)$.
27. Find the equation of the line which is parallel to the line $3y = 6x + 1$ and passes through the point $(2, 3)$.
28. Find the horizontal and vertical asymptotes of $f(x) = \frac{x^3 - 1}{x^2 - 3x - 4}$.
29. Let $T(t)$ be the temperature (in F°) of a room t minutes after the heat is turned on. In words, what do $T(60)$ and $T^{-1}(60)$ mean?
30. Find the horizontal and vertical asymptotes of $f(x) = 2x^2 + x + 7$.

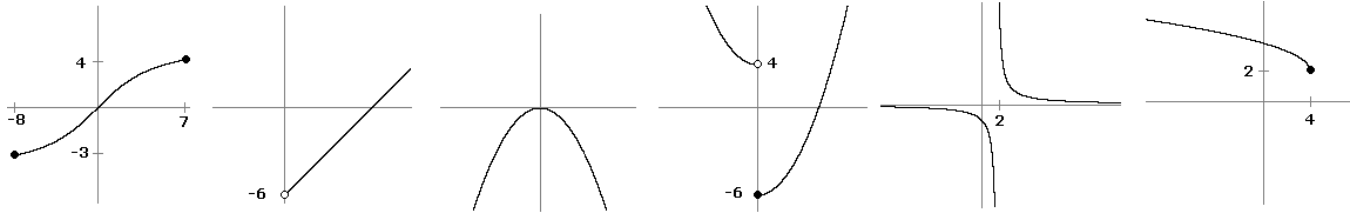
31. Find the inverse of $f(x) = 2 - \frac{2}{x}$.

32. Find the zeros of $f(x) = \frac{2x - 8}{x^{97} - x - 1}$.

33. Draw a function which has a horizontal asymptote at $y = 4$, vertical asymptotes at $x = 2$ and $x = 3$, and zeros at $x = -1$ and $x = 4$.

34. Simplify $2e^{3x}e^{-3x}$.

35. Find the domain and range of each of the functions graphed below.



36. Sketch the graph of $f(x) = \begin{cases} x^3, & x < -1 \\ x^2, & x \geq -1 \end{cases}$

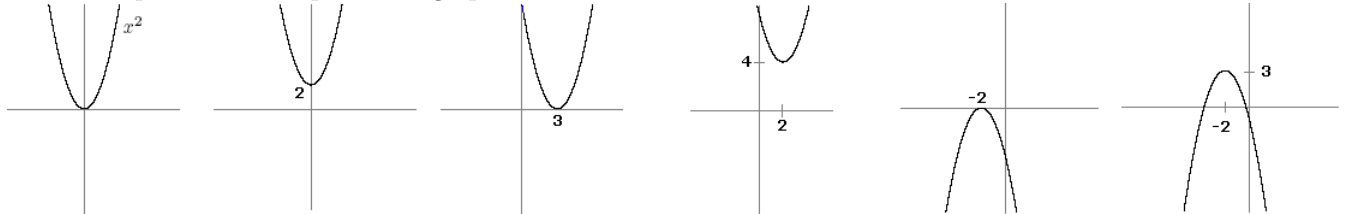
37. Find the inverse of $f(x) = \frac{1}{2}\sqrt[5]{2x+1}$.

38. Simplify $e^{2\ln x+1}$

39. Find the inverse of $f(x) = \frac{(x-2)^3}{8}$.

40. Sketch the graphs of $|x|$, $|x-2|$, $|x+3|$, $|x+5|+2$, $-|x|-3$, and $4-|x-3|$.

41. Find the equations of the parabolas graphed below.



42. Simplify $(e^{x/2})^2$.

43. The amount of daylight is a function of how far one is located from the equator. Let $A(x)$ be the amount of daylight (in hours) a region x degrees north of the equator receives on June 21. In words, what do $A(20)$ and $A^{-1}(10)$ mean?

44. Simplify $\frac{(e^x + e^{-x})^2}{e^x}$.

45. Find the zeros of $f(x) = 3(x-4)^4(x-2)^2 - 9(x-4)^3(x-2)$.

46. Sketch the graph of $f(x) = \begin{cases} x^2, & x < 0 \\ x+1, & 0 \leq x \leq 2 \\ 5, & x > 2 \end{cases}$

47. Find the horizontal and vertical asymptotes of $f(x) = \frac{3x^2 - 7}{3 - 2x^2 + 7}$.

48. Sketch a line that has a slope of -2.

49. Find the domain of $f(x) = \sqrt{x-2} + \sqrt{3-x}$.

50. Compute $\log_{100} -10000$.

51. Find the zeros of $f(x) = \frac{x^2 + x + 2}{x^2 - 25}$.

52. Find the inverse of $f(x) = \frac{x}{2} - \frac{4x}{3}$.

53. Find the zeros of $f(x) = 1 + x - \frac{2}{x}$.