

Welcome to Calculus! You will find that most calculus concepts are not difficult to grasp; however, solving calculus problems requires strong algebra and trigonometry skills. If you are weak in these areas, you will perform poorly on assessments despite having a solid understanding of calculus. It is therefore crucial that you brush up on these skills. You will be expected to know how to solve the following problems **WITHOUT A CALCULATOR** from DAY ONE.

Directions: Complete the following problems on separate paper. Work neatly and circle your final answers. This assignment will be collected the first week of school. Solutions will be available on Ms. Krummel's YouTube channel: <https://www.youtube.com/c/MichelleKrummel>.

Greek letters commonly used in calculus

1. In the left column, write the symbol corresponding to each letter. Words beginning with capital letters correspond to the symbol for the capital letter. In the right column, write the name of each symbol, using a capital letter for symbols that correspond to capital letters.

_____	alpha	_____	Δ
_____	beta	_____	π
_____	Delta	_____	α
_____	delta	_____	δ
_____	epsilon	_____	Σ
_____	theta	_____	β
_____	pi	_____	ϵ
_____	Sigma	_____	θ

Factoring

- | | | |
|---------------------------|------------------------|--|
| 2. $9x^2 - 16y^2 =$ | 6. $x^4 - 10x^2 + 9 =$ | 10. $x + ay + x^2 - a^2y^2 =$ |
| 3. $x^2 - (x + h)^2 =$ | 7. $2x^2 - x - 6 =$ | 11. $3x^3(x - 7)^3 + 4x^2(x - 7)^4 =$ |
| 4. $x^2 - 12xy + 36y^2 =$ | 8. $8x^3 - 27y^3 =$ | 12. $5x^{2/3} - 4x^{1/3} =$ |
| 5. $20 - x - x^2 =$ | 9. $(x + h)^3 - x^3 =$ | 13. $x(x + 3)^{-1/2} + 2(x + 3)^{1/2} =$ |

Simplifying Fractions

- | | | | | |
|-----------------------------------|---------------------------------------|-------------------------------------|---|---|
| 14. $\frac{x^2 + 3x}{x^2} =$ | 16. $\frac{x^2 + x - 6}{x + 3} =$ | 18. $\frac{2x - \sqrt{x} + 3}{x} =$ | 20. $\frac{a - \frac{b}{\sqrt{c}}}{c} =$ | 22. $\frac{x + y}{\frac{1}{x} + \frac{1}{y}} =$ |
| 15. $\frac{ab^2 - ba^2}{a - b} =$ | 17. $\frac{x^2 + 2x - 4}{\sqrt{x}} =$ | 19. $\frac{1 + \frac{1}{x-1}}{x} =$ | 21. $\frac{\sqrt{c} - \frac{b}{2\sqrt{c}}}{(\sqrt{c})^2} =$ | 23. $\frac{x}{1 - \frac{1}{(1 + \frac{x}{y})}} =$ |

Functions and Equations

24. If $f(x) = x^3 + 5x - 1$, then $f(1) - f(0) =$
25. If $f(x) = x^2 - 3x + 1$, then $f(x+h) - f(x) =$
26. If $f(x) = \frac{1}{2x}$, then $\frac{f(x+a) - f(x)}{a} =$
27. If $f(x) = \sqrt{x+5}$, then $\frac{f(x+h) - f(x)}{h} =$
28. Solve for a : $3x^3a + 9x^2y - 4a - 2 = 0$.
29. Solve $4x(10 - 2x) + (10 - 2x)^2 = 0$.
30. Solve $12x = x^2$.
31. Use long division to rewrite $\frac{2x^4 + 3x^3 - x^2 - 1}{x - 2}$.
32. Find the exact solutions of $x^3 + x^2 - 4x + 2 = 0$.
33. Solve $\frac{1}{x-1} + \frac{1}{x+1} + \frac{2}{x^2-1} = 0$.
34. Rationalize the denominator of $\frac{1 + \sqrt{2}}{1 - \sqrt{2}}$.
35. Write the equation of the line passing through points $(1, 5)$ and $(7, 12)$.
36. Write the equation of the line passing through the point $(2, -4)$ and parallel to the line $6x + 2y = 11$.
37. Write the equation of the line passing through the point $(2, -4)$ and perpendicular to the line $6x + 2y = 11$.
38. Explain the difference between the reciprocal of x^2 and the inverse of x^2 .
39. Find $f(g(x))$ if $f(x) = x^2 + 3x$ and $g(x) = 2x - 3$.
40. Solve $3x^2 + 24x - 12 = 0$ by completing the square.

Formulas

41. A rectangle has dimensions $x \times y$. The perimeter of the rectangle is 16. Find the area of the rectangle as a function of x .
42. Find the area of an equilateral triangle with perimeter 18.
43. Two sides of an isosceles triangle are length x . If the perimeter of the triangle is 50, find the area of the triangle as a function of x .
44. A cylindrical soup can has a volume of 2 in^3 . If the radius of the base is x inches, find the surface area of the can (including the top and bottom) as a function of x .
45. A woman 5 ft tall stands x feet away from a 20-ft high lamppost. Find the length of the woman's shadow in terms of x .
46. Find the distance from the origin to the point (x, y) on the line $y + 2x = -5$, as a function of x .

Inequalities and Piecewise Functions

47. If $f(x) = |x|$, then $\frac{f(h) - f(0)}{h} =$
48. Solve $x^2 - 4x - 12 > 0$.
49. Solve $(x+2)(1-x) < 0$.
50. Solve $3x^3 - 9x^2 - 30x \leq 0$.
51. Solve $\frac{2x - \frac{x^2+1}{x}}{x} < 0$.
52. Solve $|15x + 8| \leq 3$.
53. Solve $|15x + 8| > 3$.
54. If $x = y^2 - 1$, solve for y .

Graphing Functions

55. Sketch the graph of $y = -(x+3)^2$.
56. Sketch the graph of $g(x) = \sqrt{x-2} - 1$.
57. Sketch the graph of $y = |x+3| + 5$.
58. Sketch the graph of $f(x) = -x^3 + 2$.

59. Identify all intercepts, removable discontinuities (holes) and asymptotes for the function:

(a) $y = \frac{x^2 + 3x + 2}{4x^2 - 4}$

(b) $y = \frac{x}{x^2 - 3x - 4}$

(c) $y = \frac{2x^2 - 6x - 8}{x - 4}$

Exponents, Exponential and Logarithmic Functions

60. Simplify $\frac{x^2 - x}{x^{1/2}}$.

61. Simplify $\frac{x^{1/2}(8x^3) - (x^4 + 3)x^{-1/2}}{x}$.

62. Simplify $e^{-x}(2e^x + e^{2x})$.

63. Simplify $-e^{-x}(e^x + 1)^2 + 2e^{-x}(e^x + 1)(e^x)$.

64. Solve $\frac{2x(e^x + 1)^2 - 6xe^x(e^x + 1)}{(e^x + 1)^4} = 0$.

65. If $f(x) = e^x - 3x$, then $f(\ln 2) =$

66. If $g(x) = \ln x + \sqrt{x}$, then $g(e^2) =$

67. If $\ln y = x + 2$, solve for y .

68. If $100 = 24e^{5k}$, find the exact value of k .

69. Simplify $\ln(x + 1) - 2\ln(x - 1)$.

Trigonometry

70. $\arcsin(0) =$

76. $\arcsin\left(-\frac{\sqrt{3}}{2}\right) =$

83. $\arccos\left(-\frac{1}{\sqrt{2}}\right) =$

89. $\arctan(1) =$

71. $\arcsin\left(\frac{1}{2}\right) =$

77. $\arcsin(1) =$

84. $\arccos\left(\frac{\sqrt{3}}{2}\right) =$

90. $\arctan(-1) =$

72. $\arcsin\left(-\frac{1}{2}\right) =$

78. $\arcsin(-1) =$

85. $\arccos\left(-\frac{\sqrt{3}}{2}\right) =$

91. $\arctan\left(\frac{1}{\sqrt{3}}\right) =$

73. $\arcsin\left(\frac{1}{\sqrt{2}}\right) =$

79. $\arccos(0) =$

86. $\arccos(1) =$

92. $\arctan\left(\frac{1}{-\sqrt{3}}\right) =$

74. $\arcsin\left(-\frac{1}{\sqrt{2}}\right) =$

81. $\arccos\left(-\frac{1}{2}\right) =$

87. $\arccos(-1) =$

93. $\arctan(\sqrt{3}) =$

75. $\arcsin\left(\frac{\sqrt{3}}{2}\right) =$

82. $\arccos\left(\frac{1}{\sqrt{2}}\right) =$

88. $\arctan(0) =$

94. $\arctan(-\sqrt{3}) =$

95. State the domain and range for the following functions

(a) $f(x) = \sin x$

(c) $f(x) = \tan x$

(e) $f(x) = \cos^{-1} x$

(b) $f(x) = \cos x$

(d) $f(x) = \sin^{-1} x$

(f) $f(x) = \tan^{-1} x$

96. Pythagorean Identities

(a) $\sin^2 x + \cos^2 x =$

(b) $\tan^2 x + 1 =$

(c) $\cot^2 x + 1 =$

97. Even/Odd Properties

(a) $\sin(-\theta) =$

(b) $\cos(-\theta) =$

(c) $\tan(-\theta) =$

98. Double-Angle Formulas and Power-Reducing Formulas

(a) $\sin 2\theta =$

(b) $\cos 2\theta =$

(c) $\sin^2 \theta =$

(d) $\cos^2 \theta =$

99. Solve $4 \cos(4x) + 2 = 0$.

100. Solve $\sqrt{3} \tan^2(2x) = \tan(2x)$.

101. Substitute $u = 2 \sin x$ into the radical $\sqrt{4 - u^2}$ and simplify.

102. Substitute $u = 3 \tan \theta$ into the radical $\sqrt{9 + u^2}$ and simplify.

Are you ready to L^AT_EX?

If you'd like to get a head start, please access the Canvas course at

<https://cms.instructure.com/courses/140017>

and begin working through the tutorials.

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