

Instructions: Answer the following on a separate sheet of paper. Please include the problem statements, write neatly, box your answers and include enough white space that we can tell what you are doing. It is due on **Monday, November 28**. This is the Monday following the Thanksgiving break, and the due date was chosen so they can be graded and returned to you on the last day of class, Wednesday, November 30. If you have any questions, don't hesitate to ask, but we won't do the assignment for you!

1. If $f(x) = \ln(x^4 + 1)$, what is $f'(x)$?
2. If $g(y) = \cos(\ln(2y))$, what is the derivative?
3. Let y be a function of x and $y^2 + \ln(x/y) - 4x = -3$. Find dy/dx .
4. What is the derivative of xe^{-x} ?
5. Suppose y is a function of x and $xe^y + 2x - \ln(y + 1) = 3$. What is dy/dx ?
6. If $e^k \cos(l) = ke^l$, and $l = g(k)$, what is $g'(k)$?
7. What is an equation for the tangent line to the graph $y = x - e^{-x}$ which is parallel to $6x - 2y = 7$.
8. $f(x) = \sin^{-1}(x/3)$. What is $f'(x)$?
9. If $f(x) = \sin^{-1}(\ln(x))$, what is the derivative of $f(x)$?
10. Suppose $f(x) = 3^{\sin^{-1}(x^3)}$. What is the slope of the tangent line at $x = a$?
11. If x is a function of y and $\ln(x + y) = \tan^{-1}(xy)$, what is dx/dy ?
12. If $P = 3/w$ and $dP/dt = 5$ when $P = 9$, what is dw/dt at this point?
13. A girl starts at a point A and runs east at a rate of 12 ft/sec. One later, another girl starts at A and runs north at a rate of 10 ft/sec. At what rate is the distance between them changing 9 seconds after the second girl starts?
14. Water in a paper conical filter drips into a cylindrical cup. The filter has a height of 4 in and a radius of 2 in, and the cup also has a radius of 2 in. Let x be the height of the water above the point of the cone in the filter and y the height of the water in the cup. Find the relationship between dy/dt and dx/dt .
15. A page of a book is to have an area of 90 in^2 , with 1-in margins at the bottom and sides and a $1/2$ -in margin at the top. Find the dimensions of the page that will allow the largest printed area.
16. One thousand feet of chain link fence will be used to construct six rectangular cages for a zoo exhibit, having 2 rows with three cages each. Find the dimensions of the outermost fence that maximize the enclosed area A .