

The University of Calgary
Department of Mathematics and Statistics
MATH 249
Worksheet #4

1. Find an equation of the tangent line to

$$\sqrt{x^2 - y} = \frac{9x}{y} - 1$$

at the point P (5, 9).

2. Find a general antiderivative of $f(x) = \frac{5\sqrt{x} - 6x^3 - 8x^2 + 3}{x^2}$ for $x > 0$.
3. Solve $y'' = 2 \sin(\pi - 2x)$ with $y'(\pi) = 0$ and $y(\pi) = 3$.
4. Find the second derivative of $f(x) = x \cos(x^2)$. Simplify.
5. Find y' in terms of x and y if $2x + 3y = \frac{y^2}{x + 1}$.
6. Find a general antiderivative of $f(x) = \frac{1}{\cos^2(3x - 1)}$ in the domain (find the domain).
7. Solve $y'' = \frac{3}{\sqrt{x}} - 6x$, $y'(4) = 2$, $y(4) = 0$.
8. Find the second derivative of $y = \frac{1}{1 + x^2}$. Simplify.
9. Find an equation of the tangent line at the point $(6, \pi)$ to

$$2 \cos \frac{y}{x} + \frac{xy}{6} = \sqrt{3} + \pi.$$

10. Solve (i.e. find y including an interval)

$$y' = \frac{1}{(5 - x)^3}$$

with $y(4) = 1$

11. Find $\int \left(3\sqrt{x} - \frac{1}{3x} \right)^2 dx$ for $x > 0$.