

Problem Set 9 – Differential and Integral

1. Use a differential to estimate 52^2 if you know that $50^2 = 2500$. Test the deviation from the accurate value of 52^2 .
2. With the help of a differential, estimate $\sqrt{15}$ and 3.001^3 .
3. Calculate the following integrals:
 - A. $\int x^5 dx$
 - B. $\int (x + \sqrt{x}) dx$
 - C. $\int \left(\frac{3}{\sqrt{x}} - \frac{x\sqrt{x}}{4} \right) dx$
 - D. $\int \frac{x^8 + 3x^6 + 5x^5 - 2}{x^4} dx$
4. Use a definite integral to calculate the area bounded by the straight line $y = 2x + 1$, the x axis, the y axis and the straight line $x = 2$.
5. Calculate the area bounded by: $y = 3x^2$, the y axis and the straight line $y=3$.
6. A tangent touches intersection of the curve $y = 2x^3 + 3x^2 + 4$ and the y axis. Calculate the area that is bounded between the tangent and the line of the curve.
7. Find the equation of the tangent to the line of the curve $y = x^2 - 6x + 9$ that passes through the point $(5,0)$. Calculate the area that is bounded by the tangent, the parabola and the x axis.

8. Calculate the integral $\int_{-1}^1 x^3$. What is the geometrical significance of your answer?
What is the area that is bounded by the $y = x^3$ curve and the x axis in over the domain $[-1,1]$?

9. What, in your opinion, is the value of the integral $\int_1^{\infty} \frac{dx}{x^2}$? Explain your answer.

Do the same for: $\int_1^{\infty} \frac{dx}{\sqrt{x}}$

10. Calculate the following integrals:

A. $\int e^{5x} dx$

B. $\int \frac{dx}{3x-7}$

C. $\int \frac{dx}{1-x}$

D. $\int (x^2+1) \cdot x dx$

E. $\int \frac{(\sqrt{x}-\sqrt{a})^2 dx}{\sqrt{x}}$

F. $\int \frac{\ln x}{x} dx$

G. $\int \sqrt{x^2+1} \cdot x dx$

H. $\int \frac{xdx}{\sqrt{2x^2+3}}$

I. $\int x^2 \sqrt{1+x} dx$

J. $\int \frac{xdx}{\sqrt{a+bx}}$

H.

I.

J.

K. $\int (3x^2+2x)e^{5x} dx$

L. $\int x^\alpha \cdot \ln x dx$

M. $\int \ln(5x+1) dx$

N. $\int_0^{\sqrt{2}} \frac{3xdx}{x^2+1}$

O. $\int_0^1 \frac{xdx}{\sqrt{1-x^2}}$

P. $\int_4^8 \frac{xdx}{\sqrt{x^2-15}}$

Q. $\int \frac{2x^2+5}{x+2}$

R. $\int \frac{6x+4}{2x+5}$

S. $\int \frac{(5x+9)dx}{x^2+3x+2}$

T. $\int \frac{dx}{x^2-a^2}$

R.

S.

T.