

MTH 252Z Lab

Antiderivatives

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Prompts

1. Complete the following table by finding a particular antiderivative of the function stated on the left.

Function	Particular Antiderivative
$x^n, n \neq 1$	
$\frac{1}{x}$	
e^x	
$\cos x$	
$\sin x$	
$\sec^2 x$	
$\sec x \tan x$	
$\frac{1}{\sqrt{1-x^2}}$	
$\frac{1}{1+x^2}$	

2. Evaluate the following indefinite integrals.

(a) $\int 3 \, dx$

(e) $\int \frac{2}{\sqrt[5]{x^6}} \, dx$

(i) $\int \sec^2 x \, dx$

(b) $\int (-7) \, dx$

(f) $\int e^x \, dx$

(j) $\int (-\csc x \cot x) \, dx$

(c) $\int (4x) \, dx$

(g) $\int 2 \cos x \, dx$

(k) $\int \frac{1}{1+x^2} \, dx$

(d) $\int \sqrt[7]{x^4} \, dx$

(h) $\int \pi \sin x \, dx$

(l) $\int \frac{1}{x} \, dx$

3. Let $f(x) = \frac{2}{x} - 6x^2 + \frac{1}{1+x^2}$.

(a) Find the most general antiderivative of f .

(b) Find the antiderivative of f that passes through the point $(1, 0)$.

4. Evaluate $\int \left(3 \cos t - \frac{t^3 + 2\sqrt[3]{t}}{t^2} \right) dt$ by first rewriting the integrand so that it has no fractions (except possibly in the powers).

5. Let $f''(x) = e^x - \sin x + 3x^4$.

(a) Find every function $f'(x)$ satisfying the equation above.

(b) Find $f'(x)$ such that $f'(0) = -1$.

(c) Using the formula for $f'(x)$ that you just found, find $f(x)$ such that $f(0) = 2$.