

# CALCULUS 1

Name: Key

Integrate the following.

1.  $\int \sqrt{3-2x} dx =$   $u = 3-2x$   
 $du = -2dx$   
 $-\frac{1}{2} du = dx$   
 $\frac{1}{2} \int u^{1/2} du$   
 $\frac{1}{2} \cdot u^{3/2} \cdot \frac{2}{3} + C = \frac{1}{3} (3-2x)^{3/2} + C$

3.  $\int \frac{1}{\sqrt[5]{x^2}} - \cos x dx =$   
 $\int x^{-2/5} dx - \int \cos x dx$   
 $\frac{5}{3} x^{3/5} - \sin x + C$

5.  $\int \sin(8x-5) dx =$   $u = 8x-5$   
 $du = 8dx$   
 $\frac{1}{8} du = dx$   
 $\frac{1}{8} \int \sin u du$   
 $-\frac{1}{8} \cos(8x-5) + C$

7.  $\int \frac{4 \sin x}{(1+\cos x)^2} dx =$   $u = 1+\cos x$   
 $du = -\sin x dx$   
 $-du = \sin x dx$   
 $-4 \int u^{-2} du = -4 \frac{u^{-1}}{-1} + C = \frac{4}{1+\cos x} + C$

9.  $\int \sec x (\sec x + \tan x) dx =$   
 $\int (\sec^2 x + \sec x \tan x) dx$

$\tan x + \sec x + C$

11.  $\int \frac{4x}{\sqrt{2x^2+1}} dx =$   $u = 2x^2+1$   
 $du = 4x dx$   
 $\int \frac{1}{u^{1/2}} du$   
 $\int u^{-1/2} du$   
 $\frac{2}{1} u^{1/2} + C = 2\sqrt{2x^2+1} + C$

2.  $\int x^4 \sqrt{3x^5-5} dx =$   $u = 3x^5-5$   
 $du = 15x^4 dx$   
 $\frac{1}{15} du = x^4 dx$   
 $\frac{1}{15} \int u^{1/2} du$   
 $\frac{1}{15} \cdot u^{3/2} \cdot \frac{2}{3} + C = \frac{2}{45} (3x^5-5)^{3/2} + C$

4.  $\int x^2 - 2x + 3 dx =$   
 $\frac{x^3}{3} - x^2 + 3x + C$

6.  $\int 6x^2 \sin x^3 dx =$   $u = x^3$   
 $du = 3x^2 dx$   
 $\frac{1}{3} du = x^2 dx$   
 $6 \int x^2 \sin x^3 dx =$   
 $6 \cdot \frac{1}{3} \int \sin u du = 2 \cdot (-\cos(x^3)) + C$   
 $= -2 \cos(x^3) + C$

8.  $\int \frac{x^2+x+1}{\sqrt{x}} dx = \int \left( \frac{x^2}{x^{1/2}} + \frac{x}{x^{1/2}} + \frac{1}{x^{1/2}} \right) dx$   
 $\int (x^{3/2} + x^{1/2} + x^{-1/2}) dx$   
 $\frac{2}{5} x^{5/2} + \frac{2}{3} x^{3/2} + 2x^{1/2} + C$

10.  $\int \sin(2x) \sqrt{2-\cos(2x)} dx =$   $u = 2-\cos 2x$   
 $du = \sin(2x) \cdot 2 dx$   
 $\frac{1}{2} du = \sin(2x) dx$   
 $\frac{1}{2} \int u^{1/2} du$   
 $\frac{1}{2} \cdot u^{3/2} \cdot \frac{2}{3} + C = \frac{1}{3} (2-\cos(2x))^{3/2} + C$

12.  $\int (2x+1)^3 dx =$   $u = 2x+1$   
 $du = 2 dx$   
 $\frac{1}{2} du = dx$   
 $\frac{1}{2} \int u^3 du$   
 $\frac{1}{2} \cdot \frac{u^4}{4} + C$   
 $\frac{1}{8} (2x+1)^4 + C$