

# 2006 Calculus Challenge Formula Sheet

## SOME VALUES OF THE TRIGONOMETRIC FUNCTIONS

$\theta$	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$	$2\pi/3$	$3\pi/4$	$5\pi/6$
$\sin \theta$	0	1/2	$1/\sqrt{2}$	$\sqrt{3}/2$	1	$\sqrt{3}/2$	$1/\sqrt{2}$	1/2
$\cos \theta$	1	$\sqrt{3}/2$	$1/\sqrt{2}$	1/2	0	-1/2	$-1/\sqrt{2}$	$-\sqrt{3}/2$

## TRIGONOMETRIC IDENTITIES

$$\sin(\pi + \theta) = -\sin \theta = \sin(-\theta) \quad \cos(\pi + \theta) = -\cos \theta = -\cos(-\theta)$$

$$\sin^2 \theta + \cos^2 \theta = 1 \quad \tan^2 \theta + 1 = \sec^2 \theta$$

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta = 2 \cos^2 \theta - 1 = 1 - 2 \sin^2 \theta$$

$$\csc \theta = 1/\sin \theta, \quad \sec \theta = 1/\cos \theta, \quad \tan \theta = \sin \theta / \cos \theta, \quad \cot \theta = \cos \theta / \sin \theta$$

## BASIC INTEGRATION AND DIFFERENTIATION FORMULAS

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (n \neq -1)$$

$$\int \frac{1}{x} dx = \ln |x| + C$$

$$\int e^x dx = e^x + C$$

$$\int \sin x dx = -\cos x + C$$

$$\int \cos x dx = \sin x + C$$

$$\int \sec^2 x dx = \tan x + C$$

$$\int \csc^2 x dx = -\cot x + C$$

$$\int \sec x \tan x dx = \sec x + C$$

$$\int \csc x \cot x dx = -\csc x + C$$

$$\int \frac{1}{1+x^2} dx = \arctan x + C$$

$$\int (1-x^2)^{-1/2} dx = \arcsin x + C$$

$$\frac{d}{dx} x^n = nx^{n-1}$$

$$\frac{d}{dx} \ln |x| = \frac{1}{x}$$

$$\frac{d}{dx} e^x = e^x$$

$$\frac{d}{dx} \cos x = -\sin x$$

$$\frac{d}{dx} \sin x = \cos x$$

$$\frac{d}{dx} \tan x = \sec^2 x$$

$$\frac{d}{dx} \cot x = -\csc^2 x$$

$$\frac{d}{dx} \sec x = \sec x \tan x$$

$$\frac{d}{dx} \csc x = -\csc x \cot x$$

$$\frac{d}{dx} \arctan x = \frac{1}{1+x^2}$$

$$\frac{d}{dx} \arcsin x = (1-x^2)^{-1/2}$$