Formula Sheet for Math 135, Final Exam, Fall 2007

The Quadratic Formula

If $a \neq 0$, then the solutions to the equation $ax^2 + bx + c = 0$ are given by the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Exact Trigonometric Values

Function \ θ	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin\theta$	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
$\cos\theta$	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0
$\tan\theta$	0	$\sqrt{3}/3$	1	$\sqrt{3}$	undefined

Sum and Difference Formulas

$$\sin(\alpha+\beta) = \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta), \quad \sin(\alpha-\beta) = \sin(\alpha)\cos(\beta) - \cos(\alpha)\sin(\beta).$$

$$\cos(\alpha+\beta) = \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta), \quad \cos(\alpha-\beta) = \cos(\alpha)\cos(\beta) + \sin(\alpha)\sin(\beta)$$

Obscure Trigonometric Functions

$\cot\theta = \cos\theta/\sin\theta, \quad (\cot x)' = -\csc^2 x.$

$\csc\theta = 1/\sin\theta, \quad (\csc x)' = -\csc x \cot x.$

Exponential Growth and Compounding

A quantity is said to undergo exponential growth if the amount $P(t)$ at time t is given by a function of the form $P_0 e^{kt}$ for some constants P_0 and k. (If $k < 0$, the term exponential decay is used.)

An amount of money P_0 invested at an annual interest rate of r compounded n times a year will have grown to

$$P_0\left(1 + \frac{r}{n}\right)^{nt}$$

after t years. If the compounding is continuous, the amount is $P_0 e^{rt}$.

Areas, Volumes, Etc

Circumference of a circle, $2\pi r$.
Area of a rectangle, lw.
Area of a circle, πr^2.
Area of a triangle, $bh/2$.
Area of a sphere, $4\pi r^2$.
Volume of rectangular box, lwh.
Volume of a sphere, $4\pi r^3/3$.
Volume of a cylinder with circular base, $\pi r^2 h$.
Volume of a cone with circular base, $\pi r^2 h/3$.

Summation Formulas

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}, \qquad \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}, \qquad \sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4}.$$