CRIB SHEET FOR MATH 217 MIDTERM

This sheet will be handed out stapled to the midterm. You may freely use the following formulae and facts. Some of these will not be needed, and some formulae and facts will be needed that are not given here - those will be more standard and things you are expected to know already.

Acceleration due to gravity is 32 feet per second squared.
The area of a circle of radius r is πr^2; its circumference is $2\pi r$.
The area of a triangle with base b and height h is $\frac{1}{2}bh$.
The volume of a cylinder of height h and radius r is $\pi r^2 h$.
The volume of a cone of height h and radius r is $\frac{1}{3}\pi r^2 h$.
The volume of a sphere of radius r is $\frac{4}{3}\pi r^3$; its surface area is $4\pi r^2$.
Pythagoras's theorem: $a^2 + b^2 = c^2$, where a, b, c are the sides of a right triangle with c the hypotenuse.
The circle with center the origin and radius r has equation $x^2 + y^2 = r^2$.
$tan(t) = \frac{sin(t)}{cos(t)}, cot(t) = \frac{cos(t)}{sin(t)}, sec(t) = \frac{1}{cos(t)}, csc(t) = \frac{1}{sin(t)}$.
$sin(2t) = 2sin(t)cos(t), cos(2t) = cos^2 t - sin^2 t, cos^2 t + sin^2 t = 1, sin(\frac{t}{2}) = \pm\sqrt{\frac{1-cos(t)}{2}}, cos(\frac{t}{2}) = \pm\sqrt{\frac{1+cos(t)}{2}}$.
$sin(0) = 0 = cos(\frac{\pi}{2}), cos(0) = 1 = sin(\frac{\pi}{2}), sin(\frac{\pi}{6}) = \frac{1}{2} = cos(\frac{\pi}{3}), sin(\frac{\pi}{4}) = \frac{\sqrt{2}}{2} = cos(\frac{\pi}{4}), sin(\frac{\pi}{3}) = \frac{\sqrt{3}}{2} = cos(\frac{\pi}{6})$.
If $a \neq 0$, then the roots of $ax^2 + bx + c = 0$ are $x = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$.
$a^m a^n = a^{m+n}, \frac{a^m}{a^n} = a^{m-n}, (a^m)^n = a^{mn}, a^{-n} = 1/a^n$.
$\frac{d}{dx}(sin(x)) = cos(x), \frac{d}{dx}(cos(x)) = -sin(x), \frac{d}{dx}(tan(x)) = sec^2(x), \frac{d}{dx}(cot(x)) = -csc^2(x), \frac{d}{dx}(sec(x)) = sec(x)tan(x), \frac{d}{dx}(csc(x)) = -csc(x)cot(x)$.
$sinh(x) = (e^x - e^{-x})/2, cosh(x) = (e^x + e^{-x})/2$.
$\frac{d}{dx}(sinh(x)) = cosh(x), \frac{d}{dx}(cosh(x)) = sinh(x), \frac{d}{dx}(tanh(x)) = sech^2(x), \frac{d}{dx}(coth(x)) = -csch^2(x), \frac{d}{dx}(sech(x)) = -sech(x)tanh(x), \frac{d}{dx}(csch(x)) = -csch(x)coth(x)$.
$\frac{d}{dx}(ln(x)) = 1/x, \frac{d}{dx}(e^x) = e^x$.
$\frac{d}{dx}(sin^{-1}(x)) = 1/\sqrt{1-x^2}, \frac{d}{dx}(cos^{-1}(x)) = -1/\sqrt{1-x^2}, \frac{d}{dx}(tan^{-1}(x)) = 1/(1+x^2), \frac{d}{dx}(sec^{-1}(x)) = 1/(|x|\sqrt{x^2-1})$.
$\frac{d}{dx}(sinh^{-1}(x)) = 1/sqrtx^2 + 1, \frac{d}{dx}(cosh^{-1}(x)) = 1/sqrtx^2 - 1, \frac{d}{dx}(tanh^{-1}(x)) = 1/(1-x^2), \frac{d}{dx}(sech^{-1}(x)) = -1/(x\sqrt{1-x^2})$.
$\int a^u du = a^u/(ln(a)) + C, \int 1/u du = ln|u| + C$.
$\int sin(u)du = -cos(u) + C, \int cos(u)du = sin(u) + C, \int sec^2(u)du = tan(u) + C, \int csc^2(u)du = -cot(u) + C, \int sec(u)tan(u)du = sec(u) + C, \int csc(u)cot(u)du = -csc(u)+C, \int tan(u)du = -ln|cos(u)|+C, \int cot(u)du = ln|sin(u)|+C, \int sec(u)du = ln|sec(u) + tan(u)| + C, \int csc(u)du = ln|csc(u) - cot(u)| + C$.
$\int 1/\sqrt{a^2-u^2}du = sin^{-1}(u/a)+C, \int 1/(a^2+u^2)du = (1/a)tan^{-1}(u/a)+C, \int 1/(a^2-u^2)du = (1/2a)ln|(u+a)/(u-a)|+C, \int 1/(u\sqrt{u^2-a^2})du = (1/a)sec^{-1}(|u/a|)+C$.

Typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX