DEPARTMENT OF MATHEMATICS AND STATISTICS
AMAT 219 MAPLE COMPUTER ASSIGNMENT
DUE : FRIDAY APRIL 16 / 2004.
IF YOU HAVE A PROBLEM SEND EMAIL TO
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1. Use $evalf$ to evaluate e^π and π^e to 100 digits.

2. Use the command int to compute $\int \tan^{\frac{1}{3}}(x)\,dx$. Use the command $diff$ and $simplify$ to verify that the answer is correct.

3. Use the function int to evaluate $\int_0^\infty \frac{\ln(x)}{(x^4+1)}dx.$ (Answer : $-\frac{\pi^2\sqrt{2}}{16}$) .

4. Use the function int to find the volume of the solid obtained by rotating the planar region $0 \le y \le \frac{1}{1+x^{12}}$, $0 \le x < \infty$ about the y-axis. (A : $\frac{\pi^2}{3}$) .

5. Use triple integrals and the function int to find the mass of the solid enclosed by the cone $z = \sqrt{x^2+y^2}$, and the sphere $x^2+y^2+z^2 = 4$ with density $\delta(x,y,z) = x^2(x^2+y^2)$. (Answer : $-\frac{688}{105}\pi + \frac{1024}{105}\pi$) .

6. A gas tank has the shape of an elliptical cylinder is mounted on a truck so that its axis is horizontal. The lengths of the major and minor axis of every cross section perpendicular to axis of cylinder are 4 meters and 2 meters respectively and the tank is 6 meter long. The operator checks how much gas is in tank by a dip stick. Let $h, 0 \le h \le 2$ be the depth of gas and V be its volume.

   (a) Determine an expression for V as a function of h.
   (b) For what value of h is the tank 3/4 full? (Answer: 1.403972753) .

7. Use spherical coordinates to find the centroid of that part of the sphere $x^2+y^2+z^2 = 4$ above the plane $z = 1.$ (Answer : $\overline{x} = 0, \overline{y} = 0, \overline{z} = 27/20$).

8. The position of a particle in space at any time t (in seconds) is given by $x(t) = t^{\frac{3}{2}}$, $y(t) = 2t^{\frac{5}{2}}$, $z(t) = t^2$ (in meters). Use the commands $diff$ and $fsolve$ to fnd the time $t \ge 0$ when the partice first reach the speed of 300 $m/s.$ (Answer : $t =2.171704090$ seconds).

9. Use the function $plot$ to sketch the polar curve $r = \sin(\theta/k)$ for $\theta \in [0, 2m\pi]$ where k is the sum of the first two digits of your home phone number MINUS one.

10. Use the command $plot3d$ to plot the surface $z = \frac{\sqrt[3]{x^n+y^m}}{1+x^2+y^2},$ $-1 \le x \le 1,$ $-1 \le y \le 1$ where n is the sum of the first two digits of your id number and m is the sum of the last two digits of your id number PLUS one.