

In-class exercises, March 17, 2009

Here is a reminder of how to use Maple to evaluate multiple integrals. Consider

$$\int_0^{\sqrt{2}} \int_0^{\sqrt{2-x^2}} \int_{x^2+y^2}^2 x \, dz \, dy \, dx,$$

discussed in Example 5 on p. 361.

```
f := x;    the integrand
int(f, z = x^2 + y^2 .. 2);
int(%, y = 0 .. sqrt(2-x^2));
int(%, x = 0 .. sqrt(2));
```

The percent sign % is a shorthand for the most recently computed result.

These problems are from Section 6.3.

1. (Problem 2, p. 404) Find the average of $f(x, y) = e^{x+y}$ over the triangle with vertices $(0, 0)$, $(0, 1)$, and $(1, 0)$.
2. (Problem 9, p. 405) Find the center of mass of the region bounded by $x + y + z = 2$, $x = 0$, $y = 0$, and $z = 0$, assuming the density to be uniform.
3. (Problem 10, p. 405) Find the center of mass of the cylinder $x^2 + y^2 \leq 1$, $1 \leq z \leq 2$ if the density is by $\delta = (x^2 + y^2)z^2$.
4. (Problem 15, p. 405) Find the gravitational potential on a mass m of a spherical planet with mass $M = 3 \times 10^{26}$ kg, at a distance of 2×10^8 m from its center.