Exercises with Maxima/wxMaxima. You should work with Maxima/wxMaxima on your own computer, and reproduce all the demonstration of wxMaxima examples in lecture from Section 15.3, 15.5, 15.6, and 15.9. Then complete the following problems and verify your answers with Maxima/wxMaxima.

1. Evaluate the following double integrals in polar coordinates (`e-math/2110/exercise15-3.wxm`)
   (a) The volume (the double integral) under the graph of $f(x, y) = x + y$ over the region between $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$ on the left of the y-axis.
   (b) The volume (the double integral) under the graph of $f(x, y) = ye^x$ over the region enclosed by the circle centered at the origin with radius 5 in the first quadrant.
   (c) $\displaystyle\int_0^a \int_{-\sqrt{a^2-y^2}}^0 x^2 y \, dx \, dy$ (First convert it to polar coordinates)
   (d) $\displaystyle\int_0^2 \int_0^{\sqrt{2x-x^2}} \sqrt{x^2+y^2} \, dy \, dx$ (First convert it to polar coordinates)
2. Evaluate the following triple integrals (`e-math/2110/exercise15-6.wxm`)
   (a) $\displaystyle\int_0^1 \int_0^z \int_0^y ze^{-y^2} dxdydz$
   (b) $\displaystyle\iiint_E yz \cos x^5 dV$ over $E = \{(x, y, z) : 0 \le x \le 1,\ 0 \le y \le x,\ x \le z \le 2x\}$

Online quiz No.7: Start online quiz at the course website.

Key formulas to memorize:

1. $R = \{(r\cos\theta, r\sin\theta) : (r, \theta) \in S\}$ in polar coordinates:
$$\iint_R f(x, y) \, dxdy = \iint_S f(r\cos\theta, r\sin\theta) \, r \, drd\theta$$
2. The area of the surface $z = f(x, y)$ above the region R:
$$\iint_R \sqrt{1 + [f_x(x, y)]^2 + [f_y(x, y)]^2} \, dxdy$$