EXERCISES, Week 2 (submit by 24.10.2016)

1. Compute the iterated integral
$$\int_{-\pi}^{\pi} dx \int_{\sin x}^{\cos x} dy \int_{y+x}^{y-x} (x+y+z)dz\,.$$

2. Write the integral $\iint_S f(x,y)\,dxdy$ as an iterated integral, if S is
   (a) the triangle bounded by the lines $x=0$, $y=0$, $ax+by=c$,
   (b) rectangle bounded by the lines $y=0$, $y=a$, $x+y=0$, $x+y=2a$,
   (c) bounded by the curves $x=0$, $x=1$, $x=y^2$, $y=e^x$,
   (d) given by the inequalities $x^2+y^2\le 1$, $x+y\ge 0$.

3. Change the order of integration.
$$\text{(a)}\ \int_0^1 dy \int_0^{y^2} f(x,y)dx \qquad \text{(b)}\ \int_1^2 dx \int_{\ln x}^{3x} f(x,y)dy\,.$$

4. Compute the iterated integral
$$\int_0^1 dy \int_y^1 e^{x^2} dx.$$

5. Compute the multiple integrals
   (a) $\iint_S x^2y^2dxdy$, where S is bounded by the curves $x=1$, $x=y^2$.
   (b) $\iint_S (x+y)dxdy$, where S is given by the inequalities $x^2+y^2\le 1$, $y\ge x$.
   (c) $\iint_S |xy|dxdy$, where S is given by the inequalities $a^2\le x^2+y^2\le b^2$ $(0<a<b)$.

6. Write $\iiint_S f(x,y,z)dxdydz$ as an iterated integral, if S is given by the inequalities $x\ge 0$, $z\ge 0$, $x^2+y^2\le a^2$, $y^2+z^2\le a^2$.

7. Compute the multiple integrals
   (a) $\iiint_S (xy)^2dxdydz$, where S is given by the inequalities $0\le x\le y\le z\le 1$.
   (b) $\iiint_S (x+2y+3z)dxdydz$, where S is the prism bounded by the planes $y=0$, $z=0$, $z=2$, $x+y=2$, $2x-y+2=0$.