Solutions for these problems are only presented during the Problem Solving Sessions W5-6 in SS 2135. You are strongly encouraged to work through the problems ahead of time, and our TA Yiannis will cover the questions you are most interested in. These sessions are very valuable at developing the proper style to present cogent and rigorous mathematical solutions.

This problem solving session contains material from 4.2, 4.3, 4.4.

Problems:

1. §4.2 Exercise 7 (Page 167).
2. §4.3: Iterated integrals
   a) Describe the region D of integration and change the order of integration:
   $$\int_0^1 \int_{x^3}^{x^2} f(x,y)dydx.$$
   b) Describe the region of the space indicated by the boundaries of the triple integral, and present other 5 versions of the iterated integrals:
   $$\int_0^2 \int_0^{2-y} \int_0^{4-y^2} dxdydz.$$
   c) Present the six different iterated integrals
   $$\iiint_E f dV$$
   where E is the solid bounded by $y^2 + z^2 = 9$, $x = -2$ and $x = 2$. Then repeat with different E: bounded by $x = 2, y = 2, z = 0$, and $x + y - 2z = 2$.
3. §4.4: Change of Variables in a Double integral (A linear example):
   a) Compute the integral $\iint_S \sin\left(\frac{x+y}{x-y}\right) dA$ where S is the region of the plane bounded by the curves $x - y = 1, y = x + 5$ and the coordinate axis.
   b) A linear example (which looks non-linear): Compute the integral $\iint_S (x^2 - y^2)dA$ where S is the region of the plane bounded by the curves $xy = 1, y = x - 1$ and $y = x + 1$. (Hint: use the change of variables $x = u + v$ and $y = -u + v$.)