Due Wednesday April 16.

1. Draw the graphs of the following functions, defined on $\mathbb{R}$, and determine their suprema and infima. You need not prove your answers.

   (a) $\frac{1}{1+x^2}$.

   (b) $e^{\frac{-1}{x^2}}$ (this is defined to be 0 at $x = 0$.)

2. (Bonus) Prove that $L_f = \frac{1}{3} = U_f$ for the function $f = x^2$ on $(0, 1)$ (without using antiderivative). Hence conclude that f is integrable on $[0, 1]$. You may use the formula

$$\sum_{i=1}^{N} i^2 = N(N+1)(2N+1)/6.$$

Do the following problems:

p517: 5, 8, 9, 22

p528: 10.

In 22, view the solid region as the region sandwiched between the graphs of two functions defined on the standard unit disk. Thus you will need to write down those two functions, using the equation for one of the cylindrical surface.

In 10, use the area formula $Area(S) = \int_D \Delta_F$ where $F(x, y)$ is the given $\mathbb{R}^4$-valued function, and $\Delta_F = [det({}^tF' \ F')]^{\frac{1}{2}}$ where F' is the 4×2 Jacobian matrix of F.