思考练习：

1、$\mathscr{L}[f'(t)] = p\tilde{f}(p) - f(0)$

2、$\mathscr{L}[f^{(n)}(t)] = p^2\tilde{f}(p) - pf(0) - f'(0)$

3、$\mathscr{L}^{-1}[e^{-\tau p}\tilde{f}(p)] = f(t)H(t-\tau)$

4、$\begin{cases} u_{xy} = x^2 y, & x > 1, y > 0 \\ u(x,0) = x^2, & x \geq 1 \\ u(1,y) = \cos y, & y \geq 0 \end{cases}$ 关于y实行Laplace变换，则原定解问题可化为_____

解：关于y作Laplace变换，其中

$$\mathscr{L}[u_{xy}] = (\mathscr{L}[u_y])_x = [p\tilde{u}(x,p) - u(x,0)]_x$$

$$= [p\tilde{u}(x,p) - x^2]_x = p\tilde{u}_x(x,p) - 2x$$

由例题3.4.1的结论可知$\mathscr{L}[\cos y] = \frac{p}{1+p^2}, \mathscr{L}[y] = \frac{1}{p^2}$ 原定解问题可化为

$$\begin{cases} \frac{\partial \tilde{u}}{\partial x} = \frac{2x}{p} + \frac{x^2}{p^3} \\ \tilde{u}(1,p) = \frac{p}{1+p^2} \end{cases}$$