In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import scipy.stats as sts
from mpl_toolkits.mplot3d import Axes3D
%matplotlib inline
```

In [2]:
```
a = np.array([0., 0.])
cov = np.array([[10., 8.], [8., 10.]])
rv = sts.multivariate_normal(a, cov)
```

Построим график плотности двумерного нормального распредел

In [ ]:
```
grid = np.mgrid[-10:10:.02, -10:10:.02]
data = [[rv.pdf((grid[0,i,j], grid[1,i,j]))
             for i in range(grid[0].shape[0])]
                 for j in range(grid[0].shape[1])]

fig = plt.figure(figsize=(12,6))
ax = fig.add_subplot(111,
                     projection='3d')
trash = ax.plot_surface(grid[0],
                        grid[1],
                        data,
                        color='g')
```

Для y $\in \{-3, 0, 1, 5\}$ построим графики $f_{\xi_1|\xi_2}(x|y)$

$$f_{\xi_1|\xi_2}(x|y) = \frac{f_{\xi_1,\xi_2}(x,y)}{f_{\xi_2}(y)}$$

$$f_{\xi_2}(y) = \int_{-\infty}^{+\infty} f_{\xi_1,\xi_2}(x,y)dx = \mathcal{N}(a_1, cov_{1,1}).pdf(y)$$

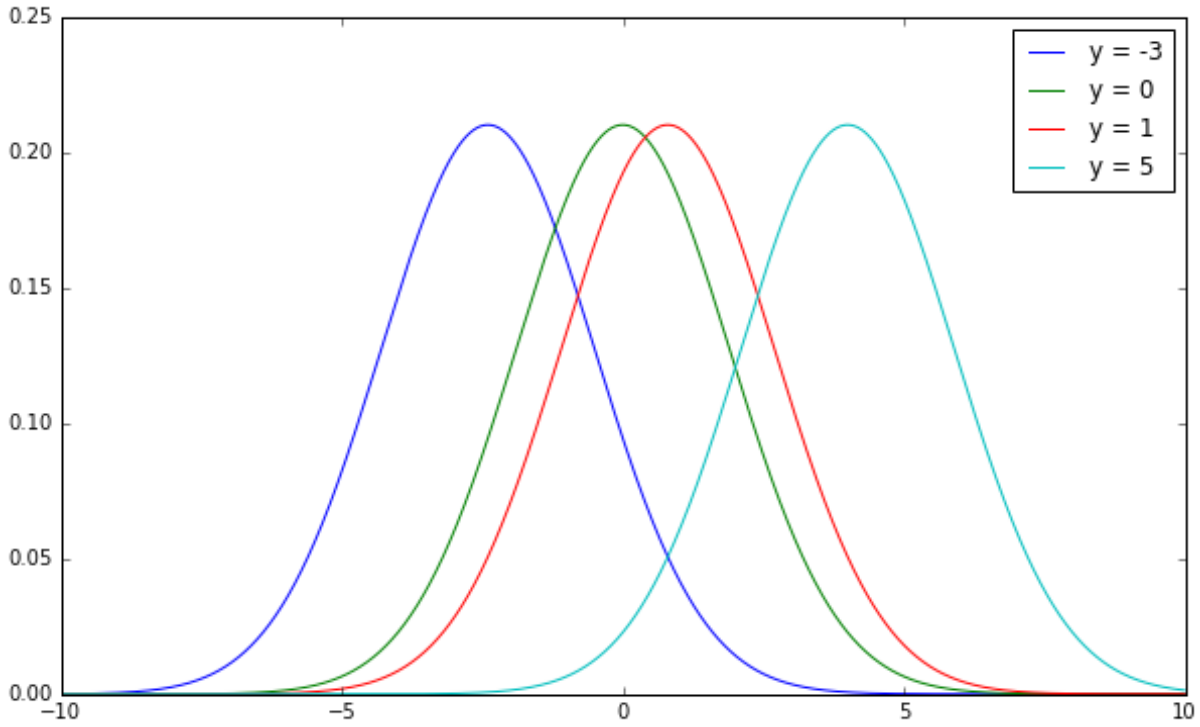
In [3]:
```
yrv = sts.norm(0, np.sqrt(10))

def f (x, y) :
    return rv.pdf([x,y]) / yrv.pdf(y)

plt.figure(figsize=(10,6))

for this_y in [-3, 0, 1, 5]:
    X = np.arange(-10, 10, .01)
    data = [f(x, this_y) for x in X]
    plt.plot(X, data, label="y = "+str(this_y))

trash = plt.legend()
```



$$Cov(5 \cdot \xi_1 - 4 \cdot \xi_2, \xi_2) =$$
$$5 \cdot Cov(\xi_1, \xi_2) - 4 \cdot Cov(\xi_2, \xi_2) = 0$$

$5\xi_1 - 4\xi_2$ независимо с ξ_2

$$E(\xi_1|\xi_2) = \frac{1}{5} \cdot E((5 \cdot \xi_1 - 4 \cdot \xi_2)$$
$$+ 4 \cdot \xi_2|\xi_2) = \frac{1}{5} \cdot E(5 \cdot \xi_1 - 4 \cdot \xi_2)$$
$$+ \frac{4}{5} \cdot \xi_2 = \frac{4}{5} \cdot \xi_2$$