**Due: Oct. 3**

1. Using the weighted least-squares approach, fit the best straight line to the following data:

| $x$: | 13 | 26 | 45 | 74 | 90 | 112 |
|---|---|---|---|---|---|---|
| $y$: | 286 | 254 | 209 | 118 | 94 | 47 |
| $w$: | 2.3 | 3.9 | 5.7 | 6.1 | 4.9 | 2.6 |

   As usually, plot the $x$-$y$ data and your regression line. Also, construct a 95% confidence interval for (each) the true slope and intercept.

2. Let two random variables $X$ and $Y$ have the bivariate Normal distribution with $\mu_x = \mu_y = 0$, $\sigma_x = \sigma_y = 1$ and the correlation coefficient $\rho$.

   a. With the help of the corresponding moment generating function, find the following means:

$$\mathbb{E}(X \cdot Y)$$
$$\mathbb{E}(X^2 \cdot Y^2)$$
$$\mathbb{E}(X^3 \cdot Y^3)$$

   b. Utilizing the previous results, find

$$\mathbb{E}[(X_1 Y_1 + X_2 Y_2 + \ldots + X_n Y_n)^3]$$

   where $(X_1, Y_1)$, $(X_2, Y_2)$, ..... $(X_n, Y_n)$ is a random independent sample from the bivariate distribution defined above.