

**MATH-57091 Probability and Statistics for High-School Teachers.**  
**Home Work 14 due on December 12**  
**Instructor: Prof. Artem Zvavitch**

**Problem 1. (15 points)** *You have considered the following data in HW 13.*

$x$	$y$
1	4
2	7
3	8
5	12

- Please, estimate  $\sigma^2$  for it.
- Use 5 percent level of significance to test the hypothesis that  $\beta = 0$ .

**Problem 2. (20 points)** *In data relating the ages at which 25 fathers (variable  $x$ ) and their respective sons (variable  $Y$ ) first began to shave, the following summary statistics resulted*

$$\bar{x} = 13.9, \bar{Y} = 14.6, S_{xx} = 46.8, S_{YY} = 53.3, S_{xY} = 12.2.$$

- Determine the estimated regression line.
- Predict the age at which a boy will begin to shave if his father began to shave at age 15.1 years.
- Estimate  $\sigma^2$ .

**Problem 3. (20 points)** *The following table relates the number of sunspots that appeared each year from 1970 to 1980 to the number of automobile accident deaths during that year. The data for automobile accidents death are in units of 1000 deaths.*

Year	Sunspots	Automobile deaths
70	165	54.6
71	89	53.3
72	55	56.3
73	34	49.6
74	9	47.1
75	30	45.9
76	59	48.5
77	83	50.1
78	109	52.4
79	127	52.5
80	153	53.2

*Test the hypothesis that the number of automobile accident deaths is no related to the number of sunspots. Use 5 percent level of significance.*