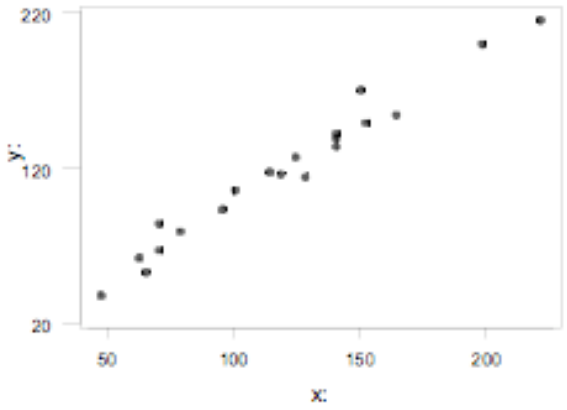
Statistics 1211 Section 4
Professor Salzman
Homework 10 Solutions

12.1.3

A scatter plot of the data appears below. The points fall very close to a straight line with an intercept of approximately 0 and a slope of about 1. This suggests that the two methods are producing substantially the same concentration measurements.



12.1.8

a. $\mu_{Y\cdot 2000} = 1800 + 1.3(2000) = 4400$, and $\sigma = 350$, so $P(Y > 5000)$

$$= P\left(Z > \frac{5000 - 4400}{350}\right) = P(Z > 1.71) = .0436$$

b. Now E(Y) = 5050, so $P(Y > 5000) = P(Z > -.14) = .5557$

c. $E(Y_2 - Y_1) = E(Y_2) - E(Y_1) = 5050 - 4400 = 650$, and
$V(Y_2 - Y_1) = V(Y_2) + V(Y_1) = (350)^2 + (350)^2 = 245{,}000$, so the s.d. of $Y_2 - Y_1 = 494.97$.

Thus $P(Y_2 - Y_1 > 0) = P\left(z > \frac{1000 - 650}{494.97}\right) = P(Z > .71) = .2389$

d. The standard deviation of $Y_2 - Y_1 = 494.97$ (from **c**), and
$E(Y_2 - Y_1) = 1800 + 1.3x_2 - (1800 + 1.3x_1) = 1.3(x_2 - x_1)$. Thus

$P(Y_2 > Y_1) = P(Y_2 - Y_1 > 0) = P\left(z > \frac{-1.3(x_2 - x_1)}{494.97}\right) = .95$ implies that

$-1.645 = \frac{-1.3(x_2 - x_1)}{494.97}$, so $x_2 - x_1 = 626.33$.

12.1.10

Y has expected value 5000 when x = 100 and 6000 when x = 200, so the two probabilities become $P\left(z > \frac{500}{\sigma}\right) = .05$ and $P\left(z > \frac{500}{\sigma}\right) = .10$. These two equations are contradictory, so the answer to the question posed is no.