Exam 2008 1

a)

We find from the f-value table that $F = 4.89 > f_{0.01}^{3,40} = 4.31 > f_{0.01}^{3,46}$. This implies that our p value is less than $1prc$

b

We get the simple linear model:

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i$$

where ϵ_i $N(0, \sigma)$. Here y_i is the work output, and x_i is the category of cownumbers. The residuals get $n - 2 = 48$ degrees of freedom since the linear model estimates two parameters: β_0 and β_1. We can test the hypothesis that $\beta_1 = 0$ by using the t-test on $\hat{\beta}_0 / se(\hat{\beta}_0)$

c)

The analysis in a only asks whether there is a significant difference in the workoutput between the different work outputs. The analysis in b) asks wheter theere is a linear relationship between the number of cows and the work output. A case where a) will give significance while b) will not is if there is difference between the categories but no linear relationship. For instance if category 1 and 4 has high work output, while categories 2 and 3 has low work output.