4.4 The general manager of a large engineering firm wants to know whether the experience of technical artists influences their work quality. A random sample of 50 artists is selected. Using years of work experience (*EXPER*) and a performance rating (*RATING*, on a 100-point scale), two models are estimated by least squares. The estimates and standard errors are as follows:

Model 1:

$$\widehat{RATING} = 64.289 + 0.990EXPER \quad N = 50 \quad R^2 = 0.3793$$
$$(se) \qquad (2.422) \quad (0.183)$$

Model 2:

$$\widehat{RATING} = 39.464 + 15.312\ln(EXPER) \quad N = 46 \quad R^2 = 0.6414$$
$$(se) \qquad (4.198) \quad (1.727)$$

a. Sketch the fitted values from Model 1 for *EXPER* = 0 to 30 years.

b. Sketch the fitted values from Model 2 against *EXPER* = 1 to 30 years. Explain why the four artists with no experience are not used in the estimation of Model 2.

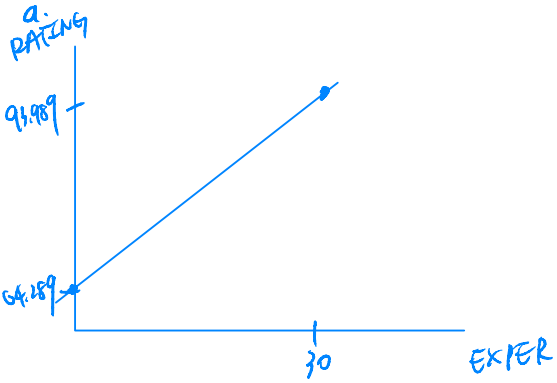
c. Using Model 1, compute the marginal effect on *RATING* of another year of experience for (i) an artist with 10 years of experience and (ii) an artist with 20 years of experience.

d. Using Model 2, compute the marginal effect on *RATING* of another year of experience for (i) an artist with 10 years of experience and (ii) an artist with 20 years of experience.

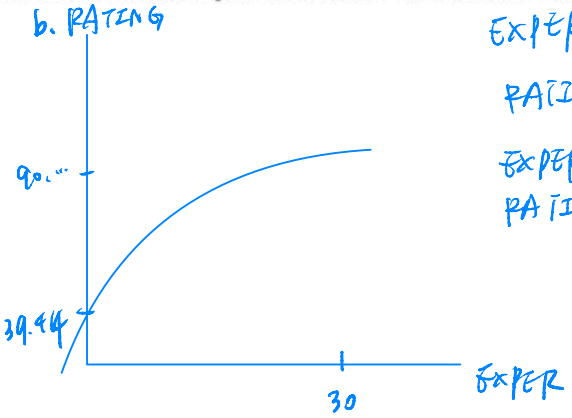
e. Which of the two models fits the data better? Estimation of Model 1 using just the technical artists with some experience yields $R^2 = 0.4858$.

f. Do you find Model 1 or Model 2 more reasonable, or plausible, based on economic reasoning? Explain.

a.



b.



EXPER=1.

RATING= 39.464

EXPER=30

RATING=

c.

$\frac{\partial \widehat{RATING}}{\partial EXPER} = 0.990$，

這個係數是固定的，不管10年還是20年都一樣，

每增加一年的影響都是 0.990。

d.

$\frac{\partial \widehat{RATING}}{\partial EXPER} = \frac{15.312}{EXPER}$

EXPER=10，邊際效果為 1.5312，10年經驗時每增加1年，評分增加 1.5312

EXPER=20，邊際效果為 0.7656，20年經驗時每增加1年，評分增加 0.7656。

e. model 2 較好，因 R^2 較能解釋模型的變異

f. Model 2 較合理，因經驗帶來的效果是邊際效用遞減的，不像 model 1 一樣，不管經驗多少帶來的效果是固定的，因此 model 2 較符合經濟意涵。