HW5 Question 2

(a) Which answer is correct, and why?

i. For a fixed value of Age and GPA, Technical positions earn more on average than nontechnical positions.

ii. For a fixed value of Age and GPA, Non-Technical positions earn more on average than Technical positions.

iii. For a fixed value of Age and GPA, Technical positions earn more on average than Non-Technical positions when the GPA is high enough.

iv. For a fixed value of Age and GPA, Non-Technical positions earn more on average than Technical positions when the GPA is high enough

iii is correct. When given the values of the θs and knowing that X1 and X2 are both constant we can simplify the linear regression model from:

Target = $\theta 0 + \theta 1X1 + \theta 2X2 + \theta 3X3 + \theta 4X1X2 + \theta 5X1X3$

To:

Target = $30 + 20X1 + 0.7X2 + 0.01X1X2 + (X1 - 3)10X3$

When $X3$ is 0, indicating that it is a Non-Technical Position, we end up with $(X1 - 3)0$ but if it's 1, indicating a Technical Position, we get $(X1 - 3)10$. We can see through these equations that if $X1$ is greater than 3, than the Technical Position will earn more on average, but if it isn't the Non-Technical Position will.

Therefore, the correct answer is iii. For a fixed value of Age and GPA, Technical positions earn more on average than Non-Technical positions when the GPA is high enough.

(b) Predict the salary of a Technical and a Non-Technical positions with Age of 27, GPA of 4.0.

$X1 = 4.0$ $X2 = 27$

Given this information, the simplified Linear Regression Model from part a will evaluate to:

Target = $122.97 + 10X3$

For the Technical Position ($X3 = 1$) would have a salary of $132.97.

For the Non-Technical Position ($X3 = 0$) would have a salary of $122.97.