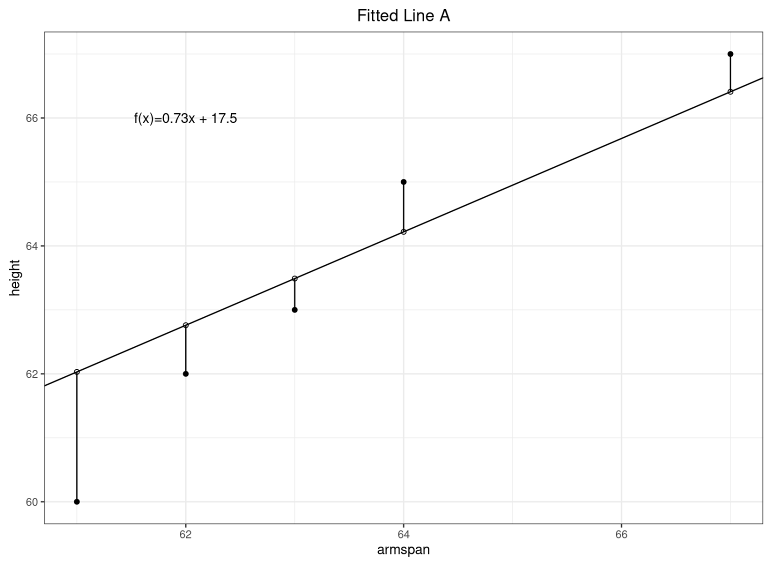
Name:________________________________ Date:______________

Which is the better fit?

Instructions:

A random sample of 5 observations was taken from the `arm_span` data. Calculate the Mean Squared Error (MSE) for each of the fitted lines by using the distances between the actual heights (the points) and their predicted heights (the points on the line). This will help you determine which of the linear models is the better fit.



Fitted Line A:

(armspan, height)	Actual height (observed)	Predicted height	Actual – Predicted	(Actual – Predicted)^2	MSE
(61, 60)	60	0.73(61) + 17.5 = 62.03	60 – 62.03 = –2.03	$(-2.03)^2$ = 4.1209	
(62, 62)	62				
(63, 63)	63				
(64, 65)	65				
(67, 67)	67				
				Sum =	÷ 5 =

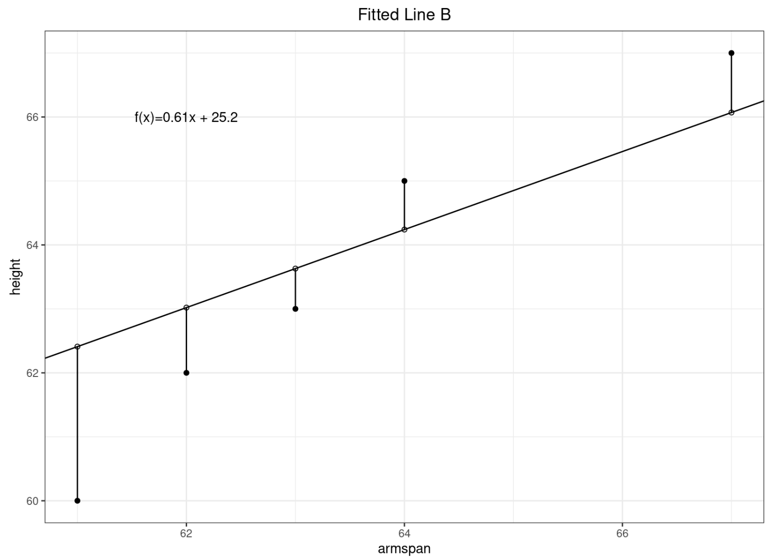
Remember: We square our values when using MSE, which means that our units are now inches^2, so you need to take the square root to get back to inches as the units.

$\sqrt{MSE} = \sqrt{\quad\quad\quad}$ = _______ inches

Interpretation: When using arm span to predict height with Fitted Line A, our predictions will typically be off by _____ inches.

Name:______________________________ Date:______________

Which is the better fit?



Fitted Line B:

(armspan, height)	Actual height (observed)	Predicted height	Actual – Predicted	(Actual – Predicted)^2	MSE
(61, 60)	60	0.61(61) + 25.2 = 62.41	60 – 62.41 = –2.41	$(-2.41)^2 = 5.8081$	
(62, 62)	62				
(63, 63)	63				
(64, 65)	65				
(67, 67)	67				
				Sum =	÷ 5 =

<u>Remember:</u> We square our values when using MSE, which means that our units are now inches^2, so you need to take the square root to get back to inches as the units.

$\sqrt{MSE} = \sqrt{\qquad\qquad}$ = _______ inches

Interpretation: When using arm span to predict height with Fitted Line B, our predictions will typically be off by _____ inches.

Conclusion:

1. Which linear model is the better fit? How do you know?

Name:_______________________________ Date:______________

Which is the better fit?

ANSWER KEY

Fitted Line A:

(armspan, height)	Actual height (observed)	Predicted height	Actual – Predicted	(Actual – Predicted)^2	MSE
(61, 60)	60	0.73(61) + 17.5 = 62.03	60 – 62.03 = –2.03	$(-2.03)^2 = 4.1209$	
(62, 62)	62	*0.73(62) + 17.5 = 62.76*	*60 – 62.76 = –2.76*	$(-2.76)^2 = 7.6176$	
(63, 63)	63	*0.73(63) + 17.5 = 63.49*	*60 – 63.49 = –3.49*	$(-3.49)^2 = 12.1801$	
(64, 65)	65	*0.73(65) + 17.5 = 64.95*	*60 – 64.95 = –4.95*	$(-4.95)^2 = 24.5025$	
(67, 67)	67	*0.73(67) + 17.5 = 66.41*	*60 – 66.41 = –6.41*	$(-6.41)^2 = 41.0881$	
				Sum = *89.5092*	÷ 5 = *17.90184*

Remember: We square our values when using MSE, which means that our units are now inches^2, so you need to take the square root to get back to inches as the units.

$\sqrt{MSE} = \sqrt{17.90184} = \underline{4.231}$ inches

Interpretation: When using arm span to predict height with Fitted Line A, our predictions will typically be off by *4.231* inches.

Fitted Line B:

(armspan, height)	Actual height (observed)	Predicted height	Actual – Predicted	(Actual – Predicted)^2	MSE
(61, 60)	60	0.61(61) + 25.2 = 62.41	60 – 62.41 = –2.41	$(-2.41)^2 = 5.8081$	
(62, 62)	62	*0.61(61) + 25.2 = 63.02*	*60 – 63.02 = –3.02*	$(-3.02)^2 = 9.1204$	
(63, 63)	63	*0.61(61) + 25.2 = 63.63*	*60 – 63.63 = –3.63*	$(-3.63)^2 = 13.1769$	
(64, 65)	65	*0.61(61) + 25.2 = 64.85*	*60 – 64.85 = –4.85*	$(-4.85)^2 = 23.5225$	
(67, 67)	67	*0.61(61) + 25.2 = 66.07*	*60 – 66.07 = –6.07*	$(-6.07)^2 = 36.8449$	
				Sum = *88.4728*	÷ 5 = *17.69456*

Remember: We square our values when using MSE, which means that our units are now inches^2, so you need to take the square root to get back to inches as the units.

$\sqrt{MSE} = \sqrt{17.69456} = \underline{4.206}$ inches

Interpretation: When using arm span to predict height with Fitted Line B, our predictions will typically be off by *4.206* inches.

Conclusion:

Which linear model is the better fit? How do you know? ***Fitted Line B is the better fit because our MSE value is 0.20728 lower, which means that the overall error is less than Fitted Line A's error.***