Regressions and the NBA

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Starting information:

1. For my honors project I chose to take the data of the top 15 ranked NBA players of all time according to Complex, and record their career statistics (ex: points, rebounds, assists, and field goal percentage).
2. Next, I put all my data into a table as my y-values and used each players height in inches as my x-value and started typing out multiple regression formulas, to be more specific I used quadratic, cubic, and quartic regression models in comparison to my data.
3. I then took my best built regression and took the derivative of it then set it to zero. The x-value I got from my zero was used to tell me the ideal height for obtaining the best possible/maximum free throw percentage.
4. I then took my original regression formula and checked my work by plugging it into Desmos and observing the maximum point.
5. Sure, enough the x-value I solved for was the x-value of the maximum point and my y-value was my best possible field goal percentage for the height/x-value I solved for. I will be breaking down all my steps in the following slides.

Step 1: My Data Collection and Sorting

- This is all the data I collected total for each player! Starting from the best and working my way down the players listed from 1-15 are as follows, 1) Michael Jordan, 2) LeBron James, 3) Kareem Abdul – Jabbar, 4) Magic Johnson, 5) Kobe Bryant, 6) Shaquille O'Neal, 7) Larry Bird, 8) Wilt Chamberlain, 9) Tim Duncan, 10) Stephen Curry, 11) Kevin Durant, 12) Bill Russell, 13) Oscar Robertson, 14)Hakeem Olajuwon, and 15) Kevin Garnett.
- My "y1" section represents the players career rebounds
- My "z1" section represents the players career assists.
- My "u1" section represents the players career free throw percentage as a decimal.
- My "v1" section represents the players career three pointers made.
- My "w1" section represents the players career field goal percentage as a decimal.
- For my chosen formula I chose to use a quadratic regression model of my "u1" section.

x_1	y_1	z_1	u_1	v_1	w_1
78	6672	5633	.835	581	.497
80	10263	10089	.734	2152	.505
86	17440	5660	.721	1	.559
81	6559	10141	.848	325	.52
78	7047	6306	.837	1827	.447
85	13099	3026	.527	1	.582
81	8974	5695	.886	649	.496
85	23924	4643	.511	0	.54
83	15090	4225	.696	30	.506
74	3898	5440	.908	3155	.473
82	6947	4261	.886	1855	.499
82	25724	4870	.561	0	.44
77	7804	9887	.838	0	.485
84	15369	3516	.712	29	.512
83	14662	5445	.789	174	.497

2. Taking The Derivative Of My Regression and Setting It To Zero

1. f(x) = -0.00177112x^2 + 0.258453x – 8.53534
2. Use the power rule to take the derivative of the regression.
3. f^1(x) = -0.00354224x + 0.258453
4. Set it equal to zero and solve, start by moving 0.258453 to the other side.
5. - 0.00354224x = - 0.258453
6. Divide both sides by – 0.00354224x to get the value for x.
7. -0.00354224x / +0.00354224x = -0.258453 / - 0.00354224
8. x = 72.96

$$u_1 \sim ax_1^2 + bx_1 + c$$

STATISTICS

$R^2 = 0.4737$

RESIDUALS

e_8 plot

PARAMETERS

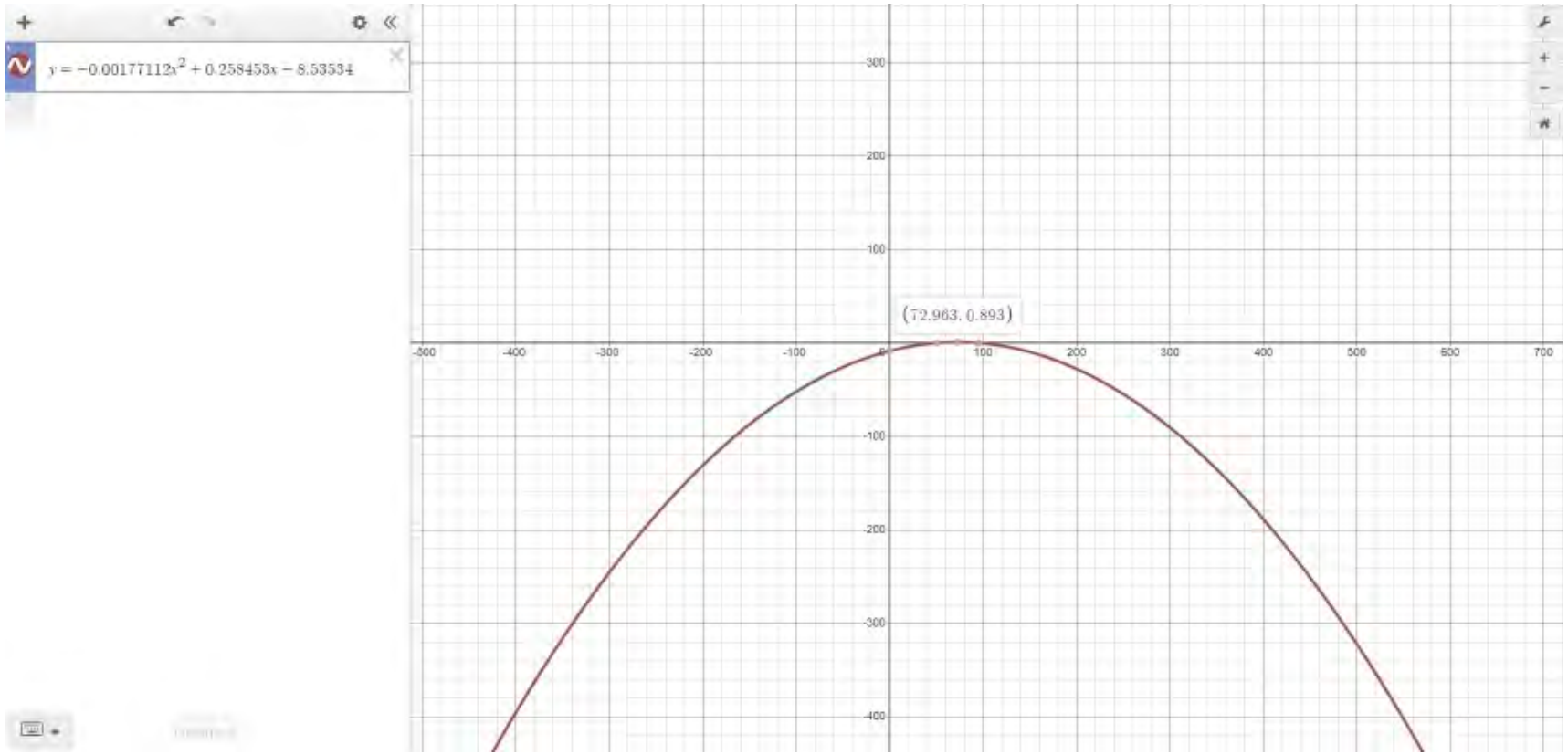
$a = -0.00177112$

$b = 0.258453$

$c = -8.53534$

3. Check My X-Value By Plugging In My Regression Formula Into Desmos

- This graph point means that the maximum free throw percentage of 89.3 percent can be best obtained with a height of 72.96 inches or 6.08 feet.



Extra Information:

- I would like to mention that conclusions drawn from my data and my regression results should be taken with a grain of salt since I did use a smaller sample size of 15. You can see that the regression wasn't exactly perfect because the r^2 had a value of .47. But in the end the math did check out and I'm really happy that all my work was a success. A multiple regression would be more useful realistically, using several of the input variables.

References:

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