**Part I.**

Sarah:

I currently own a 2002 Buick Century. I have owned this car for four years, and it belonged to my grandmother before that. She bought it new back in 2002 and kept it in good condition. Eventually, however, she stopped driving and the family decided to give the car to me- for free, no less! I was only fourteen at the time and without a Learner’s Permit, though, so it was actually an extra car for my parents for about two years. I found the MSRP for the vehicle to be around $20,535. Fifteen years later, my car is only worth around $397. While I did expect the value to be much lower, I did not expect that my car would cost less than an iPhone. Found by subtracting 397 from 20,535 and then dividing the difference by 20,535, this means that my Buick had a 98.07% of decrease- yikes! Nevertheless, it still runs well and I love my old car.

Chesney:

I have a 2005 grey Honda Civic coup. I have owned it since 2015 but it has been in the family for much longer. I am not completely sure if it was bought new originally but if I had to guess I would say it was used. I had just got my learner's permit and needed a car to learn in because my mom did not want me learning in her jeep. I started looking for the car that I have always wanted, but then my dad came and told me that my uncle was selling his old car and it was much more affordable at the time especially for a new driver. I ended up buying the car from my uncle for $2,400. According to Kelley blue book my car is worth $1,279 right now and it brand new would be worth $18,475.

Devin:

The car that my family currently owns that we consider to be mine is a 2007 GMC Envoy SLE 4D. My family has owned my car less than one year. My car’s story is that we bought it used from a close friend when the car my stepbrother and I were previously driving finally broke down after months of being extremely unreliable and having small breakdowns about every month. For the first few months of having the Envoy, my stepbrother and I had to share it and switch off to drive to school every morning until my step-brother was finally bought his own car because he would be going to community college rather than going off to school like I was. We bought my car for $3,500. According to Kelly Blue Book, my car’s current trade-in value is around $2,230 but is typically sold for anywhere between $3,990 and $12,000. When my car was new, it’s original MSRP was around $26,760-$37,190. My car’s value decreased by .98% from the original price to what its current trade-in value is. It does not surprise me that my car has decreased that much in value because it has been ten years since it was brand new which is a long period of time for a car’s value to be decreasing.

On the topic of picking a dream car, though, our group decided to go with a 2017 black, two-door Jeep Wrangler. We enjoy the sleek look of the interior and exterior, as well as the space the car provides. At its most standard price, this jeep could be purchased at $22,994.

**Part II.**

When utilizing the information from carsdirect.com, we found the value of our Jeep to drop at a stunning rate. If it depreciates 20% after leaving the lot, it is then at a value of $18,395.20. This is the number we used in following calculations, as the depreciation rate changed from 20% to 15% after the first year. We found the decay factor by subtracting the decay rate from 1. After seven years, the car is only worth $5,897.08! This is not a linear function. With the change in depreciation rate and lack of a common difference, the values would not be plotted in a line (Part II, Question 1).

|  |  |
| --- | --- |
| **YEAR** | **VALUE OF VEHICLE** |
| t = 0 | $22,994 |
| t = 1 | $18,395.20 |
| t = 2 | $13,290.53 |
| t = 3 | $11,296.95 |
| t = 4 | $9,602.41 |
| t = 5 | $8,162.05 |
| t = 6 | $6,937.74 |
| t = 7 | $5,897.08 |

|  |
| --- |
| **initial price (decay factor)time** |
| original price |
| 22,994 (.80)1 = 18,395.20 |
| 18,395 (.85)2 = 13,290.53 |
| 18,395 (.85)3 = 11,296.95 |
| 18,395 (.85)4 = 9,602.41 |
| 18,395 (.85)5 = 8,162.05 |
| 18,395 (.85)6 = 6,937.74 |
| 18,395 (.85)7 = 5,897.08 |

After plugging this data into the calculator to form a scatterplot, we observed it to be exponentially decreasing at a decreasing rate (see below) (Part II, Question 2). Following this, we found the exponential regression equation, which the calculator determined to be 21311.3363 x .8263x. It appears to be a good fit, meeting most of the line followed the path of our scatterplot (Part II, Question 3). This is clearly a decay function, as found through the fact that we are dealing with depreciation, as well as the direction of the graph, which decreases at a decreasing rate (Part II, Question 4).

Scatterplot

(Part II, Question 2)

One can determine when our Jeep will be worth 50% of its original value by utilizing the exponential regression equation. First, half of the car’s value is determined through simple division to be $11,497. Then, the original equation (21311.3363 x .8293x) is plugged into Y1 on the calculator, and 11,497 is plugged into Y2. We then graph the two functions, utilizing the “Trace” button to find the point of intersection, which determines that our Jeep Wrangler will be worth 50% of its original value after 3.23 years. This is incredibly surprising! This is an incredibly short amount of time to lose so much value on an object that was so expensive (Part II, Question 5). One can also use the formula V = C (1-r)t to find the amount of time it will take for the car to be worth half of its original value. In this case, our equation was then

11,497 = 22,994 (.85)t. This yielded 4.27 years, which is over a year longer than the time the calculator estimated with the exponential regression question. This could be due to the fact that depreciation simply started at 15% for the purpose of this equation, ignoring the initial 20% drop after the first year (Part II, Question 6). The work for this problem can be found below:

11,497 = 22,994 (.85)t

If the depreciation rate were 20%, one would find that the vehicle would reach 50% of its original value after 3.11 years, only slightly less time than with the rate above. If the depreciation rate were 30%, it would reach 50% of its original value after 1.94 years- which is almost half the time of the original 15% depreciation rate used! The work to determine these values is below (Part II, Question 7).

11,497 = 22,994 (.80)t 11,497 = 22,994 (.70)

**Part III**

We believe that a Dodge Grand Caravan Passenger would have a lower depreciation rate because it is classified as more of a standard, “family” vehicle. It is less about looks and more about function, and these vehicles are fairly sturdy and reliable. Also, it is not designed for any crazy speeds or stunts, such as a sports car, so there is less inherent risk with the minivan. A 2012 make of this car was originally priced at about $20,995. Currently worth $9,874, it is worth only about 47.03% of its original value, found by division: 9,874 / 20,995. In order to find the amount the vehicle depreciated over the five years, we then divided 47.03% by 5, yielding about 9.41%.

We would still chose to purchase our dream Jeep Wrangler! At least for us, buying a car is not about how much it will be worth when we sell it, but how well the vehicle works for us. We will have the car for many years, so its function is worth more than the price after ten years. However, we may not feel the same when it does come time to sell the car, as the greatly lowered value will affect the next vehicle we may buy. While function and look matters more, the depreciation factor may bring us to think twice before making such an investment in the future.