

Name: _____

Names of collaborators: _____

Instructions. Answer each question involving linear or exponential increase or decrease. In some cases, additional information is needed in order to answer the question. You may use Google or some other means to obtain the needed information; just make sure to state explicitly the additional information you are using, and cite the source. In other cases, there is superfluous information provided that is not necessary to answer the question. Use a complete sentence to state your final answers, and make sure to include the appropriate units.

1. I typically drive a 2019 Toyota Corolla, which gets about 34 miles to the gallon.

(a) How many gallons of fuel will I use on a trip to Chicago and back?

(b) If gas prices are about \$3.50/gallon right now, how much should I expect to spend on gas for the trip?

2. We pay two brothers, Henry and Liam, \$50 to mow our lawn during the summer. We expect to ask them to mow about once a week from May 15 to September 15. How much should we budget for paying them this year?

3. I have a Wells Fargo savings account that I have not used in 15 years. At the end of 2021, it had \$627.54 in it, and at the end of 2022, it had \$627.61 in it. (Interest in this account is compounded.)

(a) How much will it have in it at the end of 2023 (assuming I do not make any deposits or withdrawals)?

(b) How much will it have in it at the end of 2033 (again, assuming I do not make any deposits or withdrawals)?

(c) Is this linear or exponential growth?

4. Our church grew from 29 to 53 members in its first year.

(a) If we continue growing at the same relative growth rate, how many members will we have at the end of the second year?

(b) The third year?

(c) Is this linear or exponential growth?

5. A taxi charges a \$2.50 initial fee (for riding), plus \$1.20 per tenth of a mile traveled, plus \$0.40 per minute while the taxi is slowed or stopped (traveling under 10 mph, for example before and after a red light). You travel 1.3 miles and spend 5 minutes of your trip at a speed less than 10 mph.

(a) How much are you charged just for the mileage?

(b) How much are you charged for the time spent in slow or stopped traffic?

(c) What is your total charge?

(d) Does the fare increase linearly or exponentially with respect to the distance traveled?

(e) Does the fare increase linearly or exponentially with respect to the time spent in slow traffic?

(f) If you include a 15% tip, how much will you pay your driver?

6. I have decided to reduce my caffeine intake by 10% per day. Currently, I drink a 12 ounce cup of coffee every morning, which contains 200 milligrams of caffeine.

(a) If I start my caffeine reduction plan tomorrow, how much caffeine will I take in tomorrow?

(b) The next day?

(c) After 30 days?

(d) Is my caffeine reduction a linear or an exponential decrease?