

Compound Interest

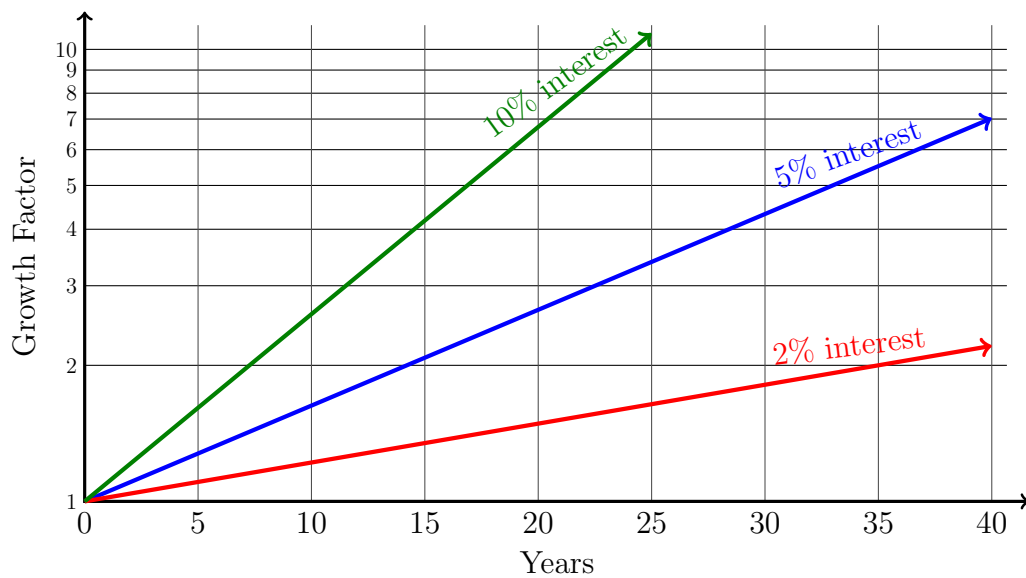
Math 111

1. In one episode of Futurama, Fry discovers that the \$0.93 in his bank account has been accruing interest for the last 1,000 years.



- (a) In the episode, Fry's bank paid interest at 2.25% per year (compounded annually). How much money does Fry have? Is it more than a million? A billion? A trillion?
- (b) If Fry had invested his money in an account paying 2.5% annually how much money would he have? How many orders of magnitude more would he have than in part (a)?
- (c) In real life, inflation makes stuff more expensive, which offsets the benefits of compound interest. Suppose inflation averaged 1.2% for the 1000 years between 2000 CE and 3000 CE. If a can of coke costs \$1 in the year 2000, how much would it cost in 3000 CE (assuming coke still exists and the cost just kept up with inflation)?
- (d) How many cans of coke could Fry buy with his money?
- (e) Do you think Fry could have bought a house with his money in 3000 CE?

2. The log-linear graph below shows the factor by which an investment will grow for different interest rates and time periods.



- (a) After 40 years, how much has an investment with a 5% interest rate grown?
- (b) About how long does it take an investment with a 10% annual interest rate to double? What about an investment with only a 2% interest rate?
- (c) How long until an investment at 10% interest will grow to be 10 times as large as the original investment?
- (d) How can you tell that the vertical axis on the graph above is log-scale? Explain.