Growth Homework Problems

1. Sometimes when we work with percentages we convert the percentage to a growth factor. Other times, we just convert the percentage to a decimal and don't add 1 to make it a growth factor. Explain why we do these two different things and under what circumstances each one is appropriate. *Hint: your answer should mention the difference between a* **"percentage change"** *versus a* **"percentage of something"**.

2. Convert the following percentage changes into growth factors.
   (a) A 25% increase is the same as multiplying by what growth factor?
   (b) A 150% increase is the same as multiplying by what growth factor?
   (c) A 40% decrease is the same as what growth factor?

3. Convert the following growth factors to a percentage change. Be sure to indicate if the change is an increase or a decrease.
   (a) 1.3
   (b) 0.75
   (c) 0.1

4. For three consecutive years the cost of tuition at one university has increased by 5%, 10%, and 8% respectively. How much has the tuition increased overall as a percentage?

5. Suppose that I want to be able to purchase a car that costs $30,000 in 4 years. If I can expect the money I invest now to grow by 20% total by the end of 4 years, then how much money should I invest now so that the investment will be enough to pay for the car when I'm ready to buy?

6. If you invest $1200 in a CD (certificate of deposit) that returns 3% interest every year, then how much money will you have at the end of 10 years?

7. Suppose a bank offers a savings account paying 6% APR (annual percentage rate), compounded monthly.
   (a) What is the monthly interest rate?
   (b) What is the monthly growth factor?
   (c) What is the annual growth factor?
   (d) What is the APY (annual percentage yield)?

8. Suppose a different bank offers a 6.1% APR, but compounded quarterly. Is this a better offer than the bank from the previous problem? Explain your answer.

9. According to the U.S. Census, the population of Virginia increased from 7,079,048 in 2000, to 7,882,590 in 2009. Calculate the growth factor and percentage change for that time period.

10. A 1/4 scale model of a car has a gas tank that holds 0.3 gallons of gas. How many gallons will the full sized car's tank hold?

11. A movie projector produces a 6 square meter image on a wall. If the projector is moved so that it is 10% farther away from the wall, then how many square meters will the image now cover?