## Exponential Growth \& Decay Problems

1. The population of Alberta can be modelled by the equation $P=2.238(1.014)^{n}$ where $P$ is the population in millions and $n$ is the number of years since 1981.
a) What was the population of Alberta in 1981?
b) At what annual rate, as a percent, has Alberta's population been increasing since 1981?
c) Estimate the population in 2021.
2. Ontario's population in 1991 was approximately 10.1 million. The population has been increasing at a rate of $1.25 \%$ per year.
a) Write an equation to represent the population of Ontario, $y$ millions and the number of years, $x$ since 1991.
b) Use your equation to estimate the population of Ontario in the year 2041
3. An elementary school currently has a population of 550 students. It has been estimated that the population of students at the school will decrease by $1.1 \%$ each year.
a) Find an equation that will give the number of students at the school each year.
b) Use your equation to predict the student population of the school in: 1 year, 5 years and 10 years.
4. The population of deer in a certain area in the year 2008 was 240 . It was estimated that the population of deer was decreasing at a rate of $2 \%$ per year.
a) Predict the number of deer in the area in the year 2015.
b) Predict the number of deer in the area in the year 2000.
5. Suppose the price of a home in Port Elgin increases by approximately $3.25 \%$ each year. In the year 2020 (at present) the average home price is $\$ 355000$.
a) Define an equation that models the average home price in Port Elgin.
b) Use your equation to estimate the average price of a home in the years: 2025, 2030 and 2010.
6. Jake has a bank account that collects interest. The balance of the savings account at the end of each year is shown below. The account balance grows exponentially. Calculate the balance in the account after 10 years.

| Year | Balance |
| :---: | :---: |
| 0 | $\$ 5000$ |
| 1 | $\$ 5250$ |
| 2 | $\$ 5512.50$ |

## ANSWERS

1. a) 2.238 million
b) $1.4 \%$
c) 3 million
2. a) $y=10.1(1.0125)^{x}$
b) 18.8 million
3. a) $y=550(.989)^{x}$
b) $544,520,492$
4. a) 208 b) 282
5. a) $y=355000(1.0325)^{x}$
b) $\$ 416561, \$ 488797, \$ 257827$
6. $\$ 8144.47$
