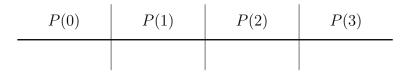
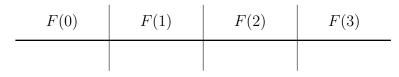
## 07 - Modeling with exponential functions

- 1. In 2010, the Canadian population was approximately 34 million people. The annual population growth rate is about 0.8%. Let P(t) be the function that gives the population t years after 2010.
  - (a) Explain why the population next year is 100.8% of what it was this year.
  - (b) Fill in the table.



- (c) Write a formula for P(t).
- (d) Use your formula to find the population in 2030.
- 2. Suppose that a forest covers an area of 5000 km<sup>2</sup> in 2019. Assume that  $\frac{1}{20}$  of the remaining forest area is removed each year. Let F(t) be a function that gives the area of the forest t years after 2019.
  - (a) If  $\frac{1}{20}$  of the area is removed each year, what fraction of it remains?
  - (b) Fill in the table.



- (c) Write a formula for F(t).
- (d) Use your formula to find the amount of forest remaining in 2035.

**3.** Suppose that \$8000 is invested at a yearly interest rate of 3.5%. Suppose the interest is compounded annually. Let A(t) be the amount of money after t years.

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(a) Fill in the table.

	A(0)	A(1)	A(2)	A(3)
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- (b) Write a formula for A(t).
- (c) Use your formula to find the amount of money after 10 years.

## Theorem: Compounding interest

Suppose that an amount M is invested, and it increases by a factor of r (or 100r%) each year. Let A(t) be the amount of money after t years.

- If the interest is compounded n times each year, then  $A(t) = M\left(1 + \frac{r}{n}\right)^{nt}$ .
- If the interest is compounded "continuously", then  $A(t) = Me^{rt}$ .
- 4. Suppose that \$8000 is invested at a yearly interest rate of 3.5%. Let A(t) be the amount of money after t years.
  - (a) Assuming that the interest is compounded quarterly, find a formula for A(t), and use it to find the amount of money after 10 years.
  - (b) Assuming that the interest is compounded continuously, find a formula for A(t), and use it to find the amount of money after 10 years.