Amount of **Simple Interest**:

\[ A = P(1 + rt) \]

where  
- \( P \) = Principal (Present Value)  
- \( A \) = Amount (Future Value)  
- \( r \) = annual rate of interest (in decimal form)  
- \( t \) = borrowing time in years

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Amount with **Interest Compounded Periodically**:

\[ A = P \left( 1 + \frac{r}{n} \right)^{nt} \]

where  
- \( P \) = Principal (Present Value)  
- \( A \) = Amount (Future Value)  
- \( r \) = annual rate of interest (in decimal form)  
- \( n \) = number of compounds per year  
- \( t \) = borrowing time in years

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Amount with **Interest Compounded Continuously**:

\[ A = Pe^{rt} \]

where  
- \( P \) = Principal (Present Value)  
- \( A \) = Amount (Future Value)  
- \( r \) = annual rate of interest (in decimal form)  
- \( t \) = borrowing time in years
Examples worked in lecture class:

1. Cal charged $1500 on his VISA card to pay tuition his first semester at FSU. (He thought it would be much easier to pay the bill after graduation.) If interest is charged at 1.5% per month compounded daily, how much will Cal owe in five years?

2. Fran just inherited $50,000 from a rich uncle. How much of her inheritance should she deposit now into an account paying 6.5% compounded continuously if she intends to have a million dollars in the account when she retires 50 years from now?

   The effective rate of interest is the equivalent annual simple rate of interest that would yield the same amount as compounding after one year.

3. Tallahassee Trust Bank pays interest on savings at 4% compounded quarterly while Seminole Savings Bank pays interest at 3.9% compounded monthly. Which bank offers the higher effective rate of interest?

4. What rate of interest will double an investment in 10 years if interest is compounded continuously?

5. What interest rate will double an investment in 3 years if compounded annually?

6. How many years will it take $12,000 to grow to $20,000 if it is invested at 7% compounded quarterly?
answers:

1. \[ A = 1500 \left(1 + \frac{.18}{365}\right)^{365.5} \approx 3688.59 \]

2. \[ P = \frac{1000000}{e^{(0.085)(20)}} = 38774.21 \]

3. \[ r = \left(1 + \frac{.04}{4}\right)^4 - 1 = .0406 = 4.06\% \] at Tallahassee Trust

\[ r = \left(1 + \frac{.0397}{12}\right)^{12} - 1 = .0397 = 3.97\% \] at Seminole Savings

Tallahassee Trust offers the higher effective rate of interest.

4. \[ r = \frac{\ln 2}{10} = 6.93\% \]

5. \[ r = 2^{\frac{1}{4}} - 1 = .2599 = 25.99\% \]

\[ t = \frac{\ln \left(\frac{5}{3}\right)}{4\ln \left(1 + \frac{.07}{4}\right)} \approx 7.36\text{ years} \]