

Aim: How do we solve problems involving compound interest?**I. Do Now:**

1. Solve for
- x
- :

$$\sqrt{2e^{4x} - 17e^{2x}} = 3$$

2. Suppose that you have \$1,000 to invest. Bank A pays interest compounded quarterly at an annual rate of 4%. Bank B pays interest at an annual rate of 4%, compounded continuously. In which bank should you invest in order to have a greater balance after 10 years? How much greater is the balance?

Recall:

Compound Interest Formula:

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

where A = final amount (balance)
 P = principal (money invested)
 r = interest rate (6% = 0.06)
 t = time, in years
 n = # of times compounded per year

Continuously Compounded Interest (as $n \rightarrow \infty$):

$$A = Pe^{rt}$$

II. Applications: (Unless otherwise indicated, round all dollar amounts to the nearest cent.)

3. Suppose Jake has \$2,000 that he invests in an account that pays 3.5% interest compounded monthly. How much money will Jake have at the end of 5 years? How much interest will he have earned?
4. William wants to have a total of \$4,000 in two years so that he can install a hot tub on his deck. He finds an account that pays 5% interest compounded quarterly.
- (a) How much money should William put into this account so that he will have \$4,000 at the end of two years?
- (b) William found another bank that offers the same rate of interest, but compounds the interest continuously. How much less money will he need to invest at this bank in order to have \$4,000 at the end of two years?
- (c) Suppose that William has only \$3,500 to invest, but still wants \$4,000 for his hot tub. He finds a bank offering 5.25% compounded quarterly. How long will he have to leave his money in the account in order to have \$4,000? (Round to the nearest tenth of a year.)
5. How long will it take for a \$3,000 investment to double if it is invested in an account that pays 3% interest compounded continuously? (Round to the nearest tenth of a year.)
6. (a) How much money must be invested in an account that pays 4.2% interest compounded continuously in order to have \$10,000 after 8 years?
- (b) Suppose you have only \$6,500 and would like to invest it in an account paying interest compounded continuously. In order to have \$10,000 at the end of 8 years, at what annual rate must the interest be paid? (Round to the nearest hundredth of a percent.)