pg. 30-31 Continuously Compounded Interest 7.2

Warm-up:

p.30

Exponential growth/decay:

A car depreciates 10% each year. If you bought this car today for $5000, how much will it be worth in 7 years?

$y = P(1 - r)^t$

$P = 5000$

$r = .10$

$t = 7$

$y = 5000(1 - .10)^7$

$y = \$2,391.49$

Tape under the warm-up

p. 30

Continuous Compounded Interest

With continuously compounded interest, you are constantly earning interest and the interest keeps earning on the previous interest.

represents a # ≈ 2.718

Formula for Continuous Compounded Interest

$$y = Pe^{rt}$$

Begin amount

Rate as decimal

time

Example: You deposit $1000 in a bank account that pays 8% annual interest. Find the balance after three years if the interest is compounded continuously.

$P = 1000$

$r = .08$

$t = 3$

$y = 1000e^{(.08 \cdot 3)}$

$\$1271.25$

p.31

1.) Find the amount of money you would have after 10 years if you invested $15,000 at a rate of 1.75%, compounded continuously.

$y = Pe^{rt}$

$y = 15000\,e^{(.0175 \cdot 10)}$

$y = \$17,868.69$

2.) Find the amount of money you would have after 4 years if you invested $20,000 at a rate of 3.5%, compounded continuously.

$y = 20000\,e^{(.035 \cdot 4)}$

$y = \$23,005.48$

p.31

3.) You deposited some money in an account that pays 2.25% interest, compounded continuously.

How long will it take your money to double?

Compounded Interest

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

4.) You need to choose where to invest $5,000.

$P = 5000$

$n = 12$ $r = .06$

Bank A offers 6% interest compounded monthly.

Bank B offers 5.75% interest compounded continuously. You plan to invest for 10 years. Where should you invest your money?

$r = .0575$

$t = 10$

BANK A

$$y = 5000\left(1 + \frac{.06}{12}\right)^{(12 \cdot 10)}$$

$9,096.98

BANK B

$$y = 5000e^{(.0575 \cdot 10)}$$

$8,885.65

Bank A because you earn more money.

Practice time: Homework worksheet