

Test 3 Review
Math 114

Finance

Sales Taxes

1) If the sales tax rate is 6.0 %, find amount of tax on item priced at \$255.00

$$.06(\$255.00) = \$15.30$$

2) A computer video store marks up the wholesale price of a video games by 30%. Find the retail price of a video game that wholesales for;

a) \$40.00

$$.30(\$40.00) = \$12.00$$

$$\$40.00 + \$12.00 = \$52.00$$

b) \$18.50

$$.30(\$18.50) = \$5.50$$

$$\$18.50 + \$5.50 = \$24.00$$

Mark Down

3) The cost of a pair of blue jeans is marked down by 20%. Find the discount price given the original price of the blue jeans is \$42.00

$$.20(\$42.00) = \$8.40$$

$$\$42.00 - \$8.40 = \$33.60$$

4) Find the original price of an item that is marked \$17.50 if the marked price represents a discount of 25%

$$\text{mark down} = .25$$

$$\text{original price} = x$$

$$x - .25x = 17.50$$

$$.75x = 17.50$$

$$\frac{.75x}{.75} = \frac{17.50}{.75}$$

$$x = \$23.33$$

Simple Interest

5) Find the simple interest on \$1500 at 1.5 % for 5 years.

$$I = PRT$$

$$I = (\$1500)(.015)(5)$$

$$I = (\$22.50)(5)$$

$$I = \$112.50$$

Compound Interest

6) Find the final balance on a savings account with \$10,000, if interest is compounded quarterly for 10 years at a rate of 2.0 % per year.

$$P = \$10,000$$

$$r = .02$$

$$t = 10 \text{ years}$$

$$n = 4 \text{ (quarterly)}$$

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

$$A = \$10,000 \left(1 + \frac{.02}{4} \right)^{4(10)}$$

$$A = \$10,000(1 + .005)^{40}$$

$$A = \$10,000(1.005)^{40}$$

$$A = \$10,000(1.220794236)$$

$$A = \$12207.94$$

7) Find the final balance on a savings account with 3,000, if interest is compounded monthly for 15 years at a rate of 2.1 % per year.

$$P = \$3,000, r = .021, t = 15 \text{ years}, n = 12 \text{ (quarterly)}$$

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

$$A = \$15,000 \left(1 + \frac{.021}{4} \right)^{4(15)}$$

$$A = \$15,000(1 + .00525)^{60}$$

$$A = \$15,000(1.00525)^{60}$$

$$A = \$15,000(1.369130693)$$

$$A = \$20536.96$$

- 8) What would be your monthly house payment, if buy a \$120,000 house and finance it over 30 years with a APR of 6.25%

$$P = \$120,000$$

$$r = 6.25\% = .0625$$

$$t = 30$$

$$n = 12$$

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

$$PMT = \$120,000 \left[\frac{\frac{.0625}{12}}{1 - \left(1 + \frac{.0625}{12}\right)^{-12(30)}} \right]$$

$$PMT = \$120,000 \left[\frac{.00520833}{1 - (1 + .00520833)^{-360}} \right]$$

$$PMT = \$120,000 \left[\frac{.00520833}{1 - (1.00520833)^{-360}} \right]$$

$$PMT = \$120,000 \left[\frac{.00520833}{1 - .1541031829} \right]$$

$$PMT = \$120,000 \left[\frac{.00520833}{.8458968171} \right]$$

$$PMT = \$120000(.0061571694)$$

$$PMT = \$738.86$$

Exponential Models

Exponential Growth

$$P = P_0(1 + r)^t$$

$P = \text{New Value}$

$P_0 = \text{Original Value}$

$r = \text{rate}$

$t = \text{time}$

Examples

- 1) The population of the United States is 300 million. What would be the population of the U. S. in 20 years, if its population would grow at a steady rate of 2.2 % for 20 years?

$$P = P_0(1 + r)^t$$

$$P_0 = 300,000,000$$

$$r = 2.2\% = .022$$

$$t = 20$$

$$P = 300000000(1 + .022)^{20} = 300000000(1.022)^{20} = 463,595,456$$

- 2) The population of Blacksburg, Virginia is 41,000. What would be the population in 10 years, if Blacksburg's population would grow at a rate of 1.9 % per year?

$$P = P_0(1 + r)^t$$

$$P_0 = 41000$$

$$r = 1.9\% = .019$$

$$t = 10$$

$$P = 41000(1 + .019)^{10} = 41000(1.019)^{10} = 49,490$$

Exponential Decay

- 3) A certain isotope decreases at a rate of 5% per year. If there is currently 400 grams of the isotope, how many grams of the isotope will there be in 20 years?

$$P = P_0(1 - r)^t$$

$$P_0 = 400$$

$$r = 5\% = .05$$

$$t = 20$$

$$P = 400(1 - .05)^{20} = 400(.95)^{20} = 143 \text{ grams}$$

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- 14) Suppose Parker Brothers determines that the profit P for a board game that is on the market for t years is given by the following equation.

$$P = 6000 + 20000(3)^{-0.2t}$$

- b) What is the profit after 25 years?

$$P = 6000 + 20000(3)^{-0.2t}$$

$$P = 6000 + 20000(3)^{-0.2(25)}$$

$$P = 6000 + 20000(3)^{-5}$$

$$P = 6000 + 20000(.004115)$$

$$P = 6000 + 82.30$$

$$P = \$6082.30$$