Part III: Investing and Budgeting

27. GloboGym Corporation has a stock price of $3 on 1/1/2000. On 1/1/2012, the price was $9. Find an **equation of the line** in **slope-intercept form** that represents a linear progression of the stock price. $(time, price)$

$(0,3)$ $(12,9)$ → $y = mx + b$

$m = \frac{9-3}{12-0} = \frac{6}{12} = \frac{1}{2}$ $3 = \frac{1}{2}(0) + b$ $\boxed{y = \frac{1}{2}x + 3}$ $3 = b$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$y = mx + b$

28. You bought a new car 6 years ago. This car loses all marketable value after 10 years. If the purchase price was $17,000, how much is it worth today? *(Assume straight-line depreciation)*

SKIP

$\frac{17,000}{10} = \$1700$ LOST PER YR.

$6 \times 1700 = 10,200$ LOST VALUE

$17,000 - 10,200 = \boxed{\$6,800 \text{ VALUE TODAY}}$

29. What would be the monthly payment on a car that costs $18,500 plus 7.6% sales tax financed over 5 years at 4% interest?

$18,500 \times .076 = 1406 + 18500 = 19,906$

$MP = \dfrac{19906(.04/12)}{(1-(1+.04/12)^{-60})} = \boxed{\$366.60/\text{MONTH}}$

30. How much would you be financing (borrowing) on a car purchase of $16,600 plus 6.9% tax, followed by a $3,000 cash down payment?

$16,600 \times .069 = +1,145.40$ TAX

$-3,000.00$ DOWN PAYMENT

$16,600$
$+1,145.40$
$-3,000.00$
$\boxed{\$14,745.40}$

31. You go to breakfast with friends and pay the bill. The check comes to $49.50 plus 6.6% sales tax. You give an 14% tip. How much does the meal cost you?

$49.50 \times .066 = \$3.27$ TAX
$+49.50$
$\$52.77$ TOTAL

$x \times .14 = \$7.39$ TIP
$+52.77$ BILL
$\boxed{\$60.16 \text{ TOTAL}}$

32. Factor $2x^2 - 7x - 9$

$(2x - 3)(x - 3)$
$\boxed{(2x - 9)(x + 1)}$ ← GUESS AND CHECK

33. Factor and Solve: $y = 4x^2 + 19x - 5$

$0 = 4x^2 + 19x - 5$
$0 = 4x^2 + 20x - 1x - 5$

$0 = 4x^2 + 20x - 1x - 5$
$0 = 4x(x + 5) - 1(x + 5)$
$0 = (x + 5)(4x - 1)$

GROUPING
$G.C = 4 \cdot -5 = -20$
$-1, +20$
$2 | 10$

$x + 5 = 0$ $4x - 1 = 0$
$\boxed{x = -5}$ $\dfrac{4x}{4} = \dfrac{1}{4}$ $\boxed{x = \frac{1}{4}}$

34. You bought a car 5 years ago. This car loses historically has depreciated at a rate of 10.5% per year *(assuming exponential depreciation)*. If the purchase price was $15,000, how much is it worth today?

SKIP

$A = P(1 - r)^t$ MINUS!

$A = 15000(1 - .105)^5$

$\boxed{A = \$8,614.03}$

35. You are purchasing a 3 year-old used car. If the current price is $16,500 and has historically depreciated at a rate of 8% per year, how much did the car cost when it was new? *(assume exponential depreciation).*

SKIP

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

$$16,500 = P(1-.08)^3$$

$$\frac{16,500}{(1-.08)^3} = \frac{P(1-.08)^3}{(1-.08)^3}$$

$$P = \frac{16500}{(1-.08)^3} =$$

$$\boxed{P = \$21,169.99}$$

36. You have a 5 year old car that is worth $12,400. It originally sold for $16,600 when it was new. What is the average rate of depreciation for this vehicle? *(assume exponential depreciation).*

SKIP

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

$$\frac{12,400 = 16,600(1-r)^5}{16,600}$$

$$.74698 = (1-r)^5$$

$$(.74698)^{\frac{1}{5}} = ((1-r)^5)^{\frac{1}{5}}$$

$$\frac{.94332 = 1-r}{-1 \quad -1}$$

$$\frac{-.05668}{-1} = \frac{-r}{-1}$$

$$\boxed{r = 5.7\%}$$

37. You bought a new car for $17,500. The historical depreciation rate for this particular car has been 11% per year *(assume exponential depreciation).* In how many years will this car be worth $10,000?

SKIP

$$\frac{10000 = 17,500(1-.11)^t}{17500}$$

$$.5742 = (1-.11)^t$$

$$(1-.11)^t = .5742$$

$$.89^t = .5742$$

$$\log_{.89}.5742 = t$$

$$\frac{\log(.5742)}{\log(.89)} = \boxed{t = 4.8 \text{ yrs}}$$

38. Conduct a breakeven analysis on the following functions to determine a pricing structure.

Cost Function: C(x) = 4x + 600
Revenue Function: R(x) = -x² + 81x – 80

BREAKEVEN IS WHERE COST = REVENUE

$$-x^2 + 81x - 80 = 4x + 600$$

$$+x^2 - 81x + 80 \quad +x^2 - 81x + 80$$

$$0 = x^2 - 77x + 680$$

QUADRATIC FORMULA: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{77 \pm \sqrt{(-77)^2 - 4(1)(680)}}{2}$$

$$= \frac{77 \pm \sqrt{5929 - 2720}}{2}$$

$$= \frac{77 \pm \sqrt{3209}}{2} = \frac{77 \pm 56.6}{2} = \boxed{\begin{array}{c}\$66.80 \\ \text{AND } \$10.20\end{array}}$$

You bought a new car for $18,500. There is 6.9% sales tax and you can get a 4.1% interest rate to finance this car over a 4 year period. You have decided to include a $2000 down payment (after taxes). The car historically depreciates at a rate of 10% per year.

39. How much tax will you be paying on this car?

$$18,500 \times .069 = \boxed{\$1,276.50}$$

40. What is your monthly payment?

$$P = 18500 + 1276.50 - 2000 = \$17,776.50$$

$$mp = \frac{17776.50\left(.041/12\right)}{\left(1 - \left(1 + .041/12\right)^{-48}\right)} = \boxed{\$402.17}$$