Mathematical Concepts — Joysheet 2
MAT 117, Spring 2011 — D. Ivanšić

Name: Solution

Show all your work!

1. (8pts) The price of a digital music player was marked down 20%. If its cost is now \$130, what was its original price?

Current price = 80% of original price

Let x = original price

$0.8x = 130 \quad | \div 0.8$

$x = \frac{130}{0.8} = 162.50$

Original price was \$162.50

2. (6pts) Sarah deposited \$1500 in an account bearing a simple annual interest rate of 3.25%. How much does she have in the account after five months?

$A = p(1+rt) = 1500\left(1 + 0.0325 \cdot \frac{5}{12}\right) = 1500.(1.013541\ldots)$

$= \$1520.31$

3. (12pts) On October 25th, Jared bought an engagement ring for \$1300. He put 10% down, and the rest he financed with a 120-day loan with a simple interest rate of 9%.
a) When is the loan due?
b) If on December 15th, Jared makes a partial payment of \$500, how much does he owe on the due date?

a) 120 days ≈ 4 months

Oct. 25 + 4 mo ≈ Feb 25th

Days from Oct 25 to Feb 25:

Oct 6 = 31 − 25
Nov 30
Dec 31
Jan 31
Feb 25
123

120 days from Oct 25th is Feb 22nd

b) 10% of 1300 is 130 so rest is

1300 − 130 = 1170 ← amount financed

Days from Oct 25 to Dec 1:

Oct 6
Nov 30
Dec 15
51

Interest from Oct 25 to Dec 15:

$i = 1170 \cdot 0.09 \cdot \frac{51}{360}$

$= 14.92$

goes toward ← principal

$500 - 14.92 = 485.08$

New principal on Dec 15th = 684.92

Interest from Dec 15 to Feb 22 (120 − 51 = 69 days)

$i = 684.92 \cdot 0.09 \cdot \frac{69}{360} = 11.81$

684.92
11.81
696.73 ← due on due date

4. (8pts) The Watsons would like to buy a $17,000 car sometime in the near future. How much should they deposit now in an account bearing 3.675%, compounded quarterly, in order to have the required amount in two years?

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

$17000 = P\left(1+\frac{0.03675}{4}\right)^{4\cdot 2}$

$17000 = P \cdot 1.0759\ldots \quad | \div 1.0759\ldots$

$P = \frac{17000}{1.0759\ldots} = 15800.62$

5. (13pts) Aunt Polly suddenly remembered that, three-and-a-half years ago, she deposited $2000 into an account that compounds daily. She checked the balance and found $2500 in the account. What is the annual interest rate on this account? (Assume 360 days in a year.)

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

$2500 = 2000\left(1+\frac{r}{360}\right)^{360\cdot 3.5} \quad | \div 2000$

$\frac{2500}{2000} = \left(1+\frac{r}{360}\right)^{1260}$

$1.25 = \left(1+\frac{r}{360}\right)^{1260} \quad | \sqrt[1260]{\ }$

$\sqrt[1260]{1.25} = 1+\frac{r}{360}$

$1.00017714\ldots = 1+\frac{r}{360} \quad | -1$

$0.00017714 = \frac{r}{360} \quad | \cdot 360$

$0.063760\ldots = r$

$r = 6.376095\,\%$

6. (13pts) You have the opportunity to invest in an account that bears 9% interest, compounded quarterly. How long will it take for your money to double?

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

$2P = P\left(1+\frac{0.09}{4}\right)^{4t} \quad | \div P$

$2 = (1.0225)^{4t} \quad | \log$

$\log 2 = \log(1.0225)^{4t}$

$\log 2 = 4t \log(1.0225) \quad | \div 4\log(1.0225)$

$t = \frac{\log 2}{4\log(1.0225)} = 7.79 \text{ years}$