
KOÇ UNIVERSITY

MATH 101 - FINITE MATHEMATICS

Midterm I Feb 25, 2020

Duration of Exam: 80 minutes

INSTRUCTIONS: CALCULATORS ARE ALLOWED FOR THIS EXAM. No books, no notes, no touching cell phones and no talking. You must always **explain your answers** and **show your work** to receive **full credit**. Use the back of these pages if necessary. **Print (use CAPITAL LETTERS)** and sign your name, and indicate your section below.

Name: _____

Surname: _____

Signature: _____

Section (Check One):

Section 1: E. Şule Yazıcı Tu-Th(13:00) _____

Section 2: E. Şule Yazıcı Tu-Th (16:00) _____

Section 3: Mine Çağlar Tu-Th (08:30) _____

Section 4: Selda Küçükçifci M-W (14:30) _____

PROBLEM	POINTS	SCORE
1	16	
2	20	
3	15	
4	25	
5	28	
TOTAL	104	

A list of formulas: $I = Prt$; $A = P(1 + rt)$

$$A = P(1 + i)^n; APY = (1 + \frac{r}{m})^m - 1; A = Pe^{rt}; APY = e^r - 1;$$

$$FV = PMT \frac{[(1+i)^n - 1]}{i}; PV = PMT \frac{[1 - (1+i)^{-n}]}{i}, \text{ where } i = \frac{r}{m} \text{ and } n = mt$$

1. (16 points) Solve the following equation.

$$\ln(-2x) + \ln(-3x - 2) - \ln 2 + e^{\ln 2} = 2$$

$$\ln \frac{(-2x)(-3x-2)}{2} + 2 = 2$$

$$\ln x(3x+2) = 0$$

$$x(3x+2) = 1 \Rightarrow 3x^2 + 2x - 1 = 0$$

$$(3x-1)(x+1) = 0$$

$$x = 1/3 \quad x = -1$$

Domain

$$-2x > 0 \quad \& \quad -3x - 2 > 0$$

$$\Downarrow \\ x < 0$$

$$\Downarrow \\ 3x < -2$$

$$x < -2/3$$

$$\text{So } S = \{-1\}$$

2. (20 points) What annual nominal rate compounded monthly will double your investment in 70 months?

$$2P = P \left(1 + \frac{r}{12} \right)^{70}$$

$$\sqrt[70]{2} = 1 + \frac{r}{12}$$

$$12 (\sqrt[70]{2} - 1) = r$$

$$r = 0.11942$$

$$11.942\%$$

5. (28 points) A person bought a house with a 20% down payment and finance the remaining amount with a 10 year mortgage that charges 1% interest per month on the unpaid balance. If his debt payments are \$1000 each month,

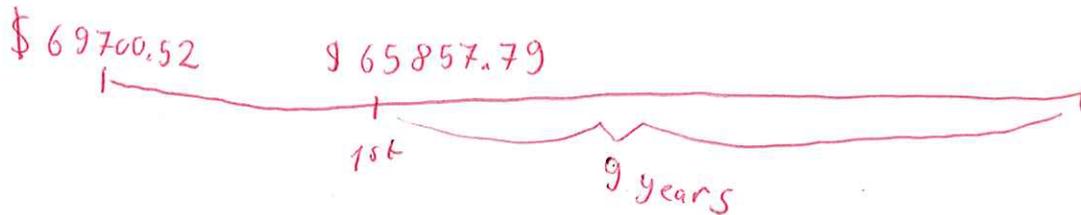
(a) How much did the house cost?

$$PV = 1000 \frac{1 - (1 + 0.01)^{-120}}{0.01}$$

$$= \$69700.52$$

$$\text{Cost of the house} = \frac{69700.52}{80} \times 100 = \$87125.65$$

(b) How much interest did he pay during the first year of his payments?



$$PV = 1000 \frac{1 - (1.01)^{-108}}{0.01} = \$65857.79$$

↓
Unpaid balance
after 1 year

Unpaid balance
reduction :

$$69700.52 - 65857.79 = \$3842.73$$

Total interest
paid :

$$12000 - 3842.73 = \$8157.27$$