All work must be shown to receive full credit.

Math 1320

NAME Answer Key

Instructor: Tuesday J. Johnson

ID: 9:00 AM class

Fall 2018

Exam 2

Thursday, October 25th, 2018

#1	/20
#2	/20
#3	/20
#4	/20
#5	/20
Grade	/100

You may use a calculator and the provided formula sheet on this exam. **You must show all of your work to receive full credit for a problem.**

All work must be shown to receive full credit.

1) Compute the simple interest *INT* for the specified length of time and the future value *FV* at the end of that time. Round all answers to the nearest cent.

$9,700 is invested for 3 months at 7% per year.

INT =

$PV = 9700 \quad t = \frac{3}{12} \quad r = 7\% = .07$

$INT = 9700(.07)\left(\frac{3}{12}\right) = \boxed{\$169.75}$

$FV = PV + INT = 9700 + 169.75$

$= \boxed{\$9869.75}$

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2) When I was considering what to do with my $10,000 lottery winnings, my broker suggested that I invest half of it in gold, the value of which was growing by 7% per year, and the other half in certificates of deposit (CDs), which were yielding 2% per year, compounded every 6 months. Assuming that these rates are sustained, how much will my investment be worth in 8 years? (Round your answer to the nearest cent.)

Gold

$r = 7\% = .07$

$t = 8$

$PV = 5000$

CDs

$r = 2\% = .02$

$m = 2$

$t = 8$

$PV = 5000$

$$FV = 5000(1 + .07)^{8} + 5000\left(1 + \frac{.02}{2}\right)^{(2*8)}$$

$$FV = 8590.930899 + 5862.893225$$

$$FV = \boxed{\$14,453.82}$$

All work must be shown to receive full credit.

3) Find the amount accumulated FV in the given account. Assume end-of-period deposits and compounding at the same intervals as deposits. Round your answer to the nearest cent.

$250 is deposited monthly for 18 years at 5% per year

PMT = 250

r = .05

m = 12 (monthly)

t = 18 years

$$FV = \frac{250\left(\left(1+\frac{.05}{12}\right)^{(12\times 18)}-1\right)}{\left(\frac{.05}{12}\right)}$$

$$FV = \boxed{\$87300.51}$$

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4) Find the periodic withdrawals *PMT* for the given annuity account. Assume end-of-period withdrawals and compounding at the same intervals as withdrawals. Round your answer to the nearest cent.

$150,000 at 2%, paid out monthly for 11 years

$PV = 150,000$

$r = 2\% = .02$

$m = 12$

$t = 11$

$PMT = ?$

$$PMT = PV \frac{(i)}{(1-(1+i)^{-n})}$$

$$= 150,000 \frac{\left(\frac{.02}{12}\right)}{\left(1-\left(1+\frac{.02}{12}\right)^{-132}\right)}$$

$$= \boxed{\$1266.89}$$

All work must be shown to receive full credit.

5) You own a hamburger franchise and are planning to shut down operations for the day, but you are left with 11 buns, 15 defrosted beef patties, and 13 opened cheese slices. Rather than throw them out, you decide to use them to make burgers that you will sell at a discount. Plain burgers each require 1 beef patty and 1 bun, double cheeseburgers each require 2 beef patties, 1 bun, and 2 slices of cheese, while regular cheeseburgers each require 1 beef patty, 1 bun, and 1 slice of cheese. How many of each should you make? **Show all of your work.**

x = plain y = dbl z = reg ch

buns $11 = x + y + z$

beef $15 = x + 2y + z$

Cheese $13 = 2y + z$

Reasoning:

Comparing beef and buns

$y = 4$ doubles

Comparing beef and cheese

$x = 2$ plain

To use all buns

$6 + z = 11$

so $z = 5$ regular chb

OR

Elimination:

-1 buns $\quad -x - y - z = -11$

$+$ beef $\quad x + 2y + z = 15$

NEW EQ 2 $\quad y = 4$

$$\begin{cases} x + y + z = 11 \\ y = 4 \\ 2y + z = 13 \end{cases}$$

-2 EQ2 $\quad -2y = -8$

$+$ EQ3 $\quad 2y + z = 13$

NEW EQ3 $\quad z = 5$

$$\begin{cases} x + y + z = 11 \\ y = 4 \\ z = 5 \end{cases} \rightarrow \text{so } x = 2$$

Matrices:

$$\begin{bmatrix} 1 & 1 & 1 & 11 \\ 1 & 2 & 1 & 15 \\ 0 & 2 & 1 & 13 \end{bmatrix} \xrightarrow{-1R_1 + R_2} \begin{bmatrix} 1 & 1 & 1 & 11 \\ 0 & 1 & 0 & 4 \\ 0 & 2 & 1 & 13 \end{bmatrix}$$

$$\xrightarrow{\substack{-2R_2 + R_3 \\ -R_2 + R_1}} \begin{bmatrix} 1 & 0 & 1 & 7 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & 5 \end{bmatrix} \xrightarrow{-R_3 + R_1} \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & 5 \end{bmatrix}$$

Regardless of method:

2 plain burgers, 4 double-doubles,

5 regular cheeseburgers