MATH 166 EXAM 3 REVIEW

FINANCE

① $Pe^{rt} = 600e^{(.086 \times 44/12)} = 822.42968... \rightarrow \$822.43$

$F = P(1+rt) = 600(1+.086*44/12) = \$789.20$

② a) N=? PMT=−100 → N = 81.27... ⇒ 82 months
I=24 FV=0
PV=4000 P/Y=12

b) $100 * 82 = \$8200$, $8200 - 4000 = \$4200$ in interest

c) $4000 * .24/12 = \$80$, \$20 to pay off balance

d) Owe $4000 - 20 = 3980$, Interest $= 3980 * .24/12 = \$79.6$

e) N = 82 − 24 = 58 PMT LEFT PMT=−100
I=24 FV=0 → \$3414.52
PV=? (what you owe) P/Y=12

③ N=25×12 PMT=1600 → \$248,330.98
I=6 FV=0
PV=? P/Y=12

④ N=19 PMT=1,000,000
I=8.5 FV=0 → \$9,267,720.22
PV=? P/Y=1

⑤ N=10×2 PMT=3000
I=9 FV=? → \$94,114.27 $* \frac{.09}{2} =$ \$4235.14 interest 1st ½ of 11th yr
PV=0 P/Y=2

N=20×2 PMT=3000
I=9 FV=? → \$321,090.97 $* \frac{.09}{2} =$ \$14,449.09 interest 1st ½ of 21st yr
PV=0 P/Y=2

Y1 Y2 ... Y10 (10th) (11th yr)
1 2 3 4 19 20 21

BONUS START WITH \$10,000 in acct,
N=20 PMT=3000
I=9 FV= → \$118,231.41
PV=10000 P/Y=2

⑥ Eff(2,6,4) = 2.625% ← Better deal

Eff(2,58,365) = 2.613%

⑦ N = 2 PMT = 0 I = 5.409%

I = ? FV = -22222

PV = 20000 P/Y = 1 switch to lose $ ⇒ -5.131%

⑧ $220,000 * .2 = $44,000 down payment

⇒ finance 220,000 - 44,000 = $176,000

a) N = 40x12 = 480 PMT = ? → $1005.43

I = 6.3 FV = 0 (1005.43) x 480 - 176,000

PV = 176,000 P/Y = 12 = $306,606.40 in interest

b) 176,000 * 0.063/12 = $924 in interest

1005.43 - 924 = $81.43 to pay off loan

c) N = 480 - 10x12 = 360 PMT remaining PMT = 1005.43

I = 6.3 FV = 0

PV = ? what you still owe P/Y = 12

⇒ owe bank 162,435.52 (Paid off 13,564.48)

EQ = 220000 - 162,435.52 = $57,564.48

d) N = 360 → PMT = $1089.39, INT PAID = $216,180.40

e) N = 240 → PMT = $1291.57, INT PAID = $133,976.80

9. N = 51 x 365 (18615) PMT = 0

I = 4 FV = ? → $384.49

PV = 50 P/Y = 365

⑩ You have $500,000 saved for retirement. An account pays 3% annual interest cmp monthly. You withdraw $2000/mo. How much after 10 years? Note 500,000 x .03/12 = $1250

N = 120 PMT = 2000 → $395,194.

I = 3 FV = ?

PV = 500000 P/Y = 12

MATH 166 EXAM 3 REVIEW

SYSTEMS OF LINEAR EQNS

① $\left[\begin{array}{cccc|c} 1 & 0 & -2 & 0 & 0 \\ 0 & 1 & 1 & 1 & -3 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$ $x-2t=0$, $y+t+s=-3$, $0=0$ $\quad (x,y,z,w)=(2t,-3-t-s,t,s)$ t and s any $\mathbb{R}$

② (A) $s=0, t=0$ so $(-7,1,0,0)$ is correct.
(B) $s=0, t=1$ so $(3(1)-7, 1, 0, 1)=(-4,1,0,1)$ is correct
(C) $s=1, t=0$ so $(-7,-2+1,1,0)=(-7,-1,1,0)$ NOT correct
(D) $s=1, t=1$ so $(-4,-1,1,1)$ is correct

③ x = # of carts
y = # of vans
z = # of muni vans

$9000x+27000y+27000z=162{,}000$
$3x+8y+7z=48$

$\left[\begin{array}{ccc|c} 9 & 27 & 27 & 162 \\ 3 & 8 & 7 & 48 \end{array}\right] \xrightarrow{\text{ref}} \left[\begin{array}{ccc|c} 1 & 0 & -3 & 0 \\ 0 & 1 & 2 & 6 \end{array}\right]$ $x-3t=0$, $y+2t=6$

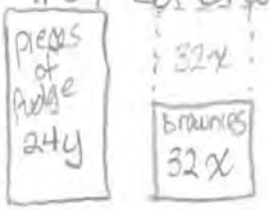
$(x,y,z)=(3t,6-2t,t)$ t = # of muni vans

$t=0 \Rightarrow (0,6,0)$ Buy 0 carts, 6 vans and 0 m-vans
$t=1 \Rightarrow (3,4,1)$ Buy 3 carts, 4 vans and 1 m-van
$t=2 \Rightarrow (6,2,2)$ Buy 6 carts, 2 vans and 2 m-vans
$t=3 \Rightarrow (9,0,3)$ " 9 " 0 " 3 "

OR Buy $t=0,1,2,3$ muni vans, $3t$ carts and $6-2t$ vans

④ x = # of batches of brownies
y = # of batches of fudge

$x+1.5y=15$ lb nuts
$24y=2(32x)$



OR x = # of brownies
y = # of pieces of fudge

$(x/32)+1.5(y/24)=15$ lbs nuts
$y=2x$

⑤ $6x + 0y + z = 5$
$9x + 1.5y + 0z = 8$
$3x + 18y + 0z = 8.5$

$\rightarrow \left[\begin{array}{ccc|c} 6 & 0 & 1 & 5 \\ 9 & 1.5 & 0 & 8 \\ 3 & 18 & 0 & 8.5 \end{array}\right]$ rref $\rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 0 & 5/6 \\ 0 & 1 & 0 & 1/3 \\ 0 & 0 & 1 & 0 \end{array}\right]$ $x = 5/6$, $y = 1/3$, $z = 0$

$6x + 9y + 0z = 5$
$9x + 0y + z = 8$
$3x + 4.5y + 0z = 9$

$\rightarrow \left[\begin{array}{ccc|c} 6 & 9 & 0 & 5 \\ 9 & 0 & 1 & 8 \\ 3 & 4.5 & 0 & 9 \end{array}\right]$ rref $\rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 1/9 & 0 \\ 0 & 1 & -2/27 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]$ NO SOLN

⑥ x = # lb Columbians coffee
y = # lb Kona coffee
z = # lb Blue mt coffee

lb col
x

+3
lb K
y

$x + y + z = 50$
$x = y + 3$
$8x + 9y + 15z = 50 \times 11.70$

$\rightarrow \left[\begin{array}{ccc|c} 1 & 1 & 1 & 50 \\ 1 & -1 & 0 & 3 \\ 8 & 10 & 15 & 585 \end{array}\right]$ rref $\rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 0 & 15 \\ 0 & 1 & 0 & 12 \\ 0 & 0 & 1 & 23 \end{array}\right]$ $x = 15$, $y = 12$, $z = 23$

Use 15lb of columbian coffee, 12 lb of Kona coffee and 23 lb of Blue mt coffee

Matrices #6: X = (I-A)^-1*D. Store A as [A], D = 1500, 6500, 4000 as a 3x1 matrix in [D]. Then X = (identity(3) - [A])^-1*[D] = 12694, 16127, 10189 as a 3x1 matrix. So produce $12,694 of stone, $16,127 of farming, and $10,189 of hunting. The entry in a12 says to make one unit of farming requires 0.3 units of stone.

MATH 166 EXAM 3 REVIEW

MATRICES

① $A \cdot B = \begin{matrix} T \\ S \end{matrix}\begin{bmatrix} & \end{bmatrix}\begin{matrix} P & Q \end{matrix} \quad \begin{matrix} R \\ M \end{matrix}\begin{bmatrix} & \end{bmatrix}\begin{matrix} T & S \end{matrix}$ Meaningless

$$B \cdot A = \begin{matrix} R \\ M \end{matrix}\begin{bmatrix} .5 & .8 \\ .5 & .2 \end{bmatrix}\begin{matrix} T & S \end{matrix} \quad \begin{matrix} T \\ S \end{matrix}\begin{bmatrix} 60 & 75 \\ 45 & 50 \end{bmatrix}\begin{matrix} P & Q \end{matrix} = BA = \begin{matrix} R \\ m \end{matrix}\begin{bmatrix} & \end{bmatrix}\begin{matrix} P & Q \end{matrix}$$

$(BA)_{11} = \underbrace{.5 \times 60}_{\text{Tiger brand road bikes at Paddington}} + \underbrace{.8 \times 45}_{\text{Snake brand road bikes in Paddington}} = \text{total road bikes at Paddington}$

$\Rightarrow$ Answer (B), # of Road & mtn bikes at each store

② $2X + D = XB \Rightarrow D = XB - X \cdot 2I = X(B - 2I)$

$D(B-2I)^{-1} = X(B-2I)(B-2I)^{-1} = X$

③ $\begin{bmatrix} a & -2 \\ 2 & d \end{bmatrix}^T + 4\begin{bmatrix} 1 & b \\ c & 0 \end{bmatrix} = \begin{bmatrix} a & 2 \\ -2 & d \end{bmatrix} + \begin{bmatrix} 4 & 4b \\ 4c & 0 \end{bmatrix} = \begin{bmatrix} a+4 & 2+4b \\ -2+4c & d+0 \end{bmatrix} = \begin{bmatrix} 2 & 4 \\ -6 & -3 \end{bmatrix}$

$\Rightarrow a+4 = 2 \Rightarrow a = -2 \qquad 2+4b = 4 \Rightarrow b = 1/2$

$-2+4c = -6 \Rightarrow c = -1 \qquad d = -3$

④ G_1 is 1×3, $F \times G_1$ is $(3\times3)(1\times3)$ NOT POSSIBLE

$G_1 \times F$ $(1\times3)(3\times3)$ $\begin{matrix} & B & R & S \end{matrix}$ $\begin{matrix} A \\ B \\ C \end{matrix}\begin{pmatrix} & & \end{pmatrix}$ NO

G_2 3×1 $FG_2 = \begin{matrix} A \\ B \\ C \end{matrix}\begin{pmatrix} & & \end{pmatrix}\begin{matrix} B \\ R \\ S \end{matrix}\begin{pmatrix} \$ \end{pmatrix}$ ✓

⑤ a) DNE b) 6×6 c) DNE b/c C is singular

d) $(7\times7)(7\times6)$ is 7×6 e) $(6\times6)(6\times7)$ is 6×7