BOOK No. _____ **CONCORDIA UNIVERSITY**

NUMBER OF
BOOKS USED _____ ADDITIONAL BOOK (to be placed inside back cover of first book)

FILL IN THE FOLLOWING:

NAME MATH. 208.
(Please Print) SURNAME GIVEN NAMES

SUBJECT Midterm Solutions.
(Course and Number)

COURSE GIVEN BY _____

EXAMINATION SUPERVISED _____

DATE WRITTEN OCT. 2014.

1. $f(x) = 0.5x^2 - 2x + 5$

A. $x$-inter.: $0.5x^2 - 2x + 5 = 0$

$$x^2 - 4x + 10 = 0$$

$$x = \frac{4 \pm \sqrt{16 - 4(1)(10)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{-24}}{2} \Rightarrow \text{no } x\text{-inter.}$$

$y$-inter. $= 5$

B.

$$V_x = \frac{-b}{2a} = \frac{2}{1} = 2$$

$$V_y = \frac{1}{2}(2)^2 - 2(2) + 5 = 2 - 4 + 5 = 3.$$

$\Rightarrow V(2,3)$

$\therefore$ Vertex Form: $y = a(x - V_x)^2 + V_y$

$$y = \frac{1}{2}(x-2)^2 + 3.$$

C. $V(2,3)$

Min. Value $= 3$.

2. A. $5^{(7x-x^2)} = (125)^{-6}$

$5^{(7x-x^2)} = (5^3)^{-6} = (5)^{-18}$

$7x - x^2 = -18$

$x^2 - 7x - 18 = 0$

$(x-9)(x+2) = 0$

$x = 9; -2.$

B. $\ln x + \ln(x+1) = \ln 6$

$\ln[x(x+1)] = \ln 6$

$x(x+1) = 6$

$x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = -3; 2 \Rightarrow$ only solution:

$x = 2.$

C. $e^{(x^2-5x)} = 1$

$\ln e^{(x^2-5x)} = \ln(1) = 0$

$x^2 - 5x = 0 \Rightarrow x(x-5) = 0 \equiv x = 0;$
$x = 5.$

D. $\log_4(x^2-9)=2$

$(4)^{\log_4(x^2-9)} = (4)^2$

$x^2-9=16$

$x^2=25$

$x=\pm 5.$

3. A. $a_{11}=20$

$a_{19}=-28$

$S_{76}$?

$a_n = a_1+(n-1)d \Rightarrow a_{11}=a_1+10d$

$a_{19}=a_1+18d$

$20=a_1+10d$

$-28=a_1+18d$ $(-)$

$20=a_1+10d$

$28=-a_1-18d$

$48=-8d$

$d=-6.$

$20=a_1+10(-6)$

$a_1=80.$

$$S_{76} = \frac{76}{2}\left(2(80) + 75(-6)\right)$$

$$= 38(160 - 450)$$

$$= 38(-290)$$

$$S_{76} = -11020.$$

B.

100, 50, 25 . . . . .

$a_{10}$ ? $S_{\infty}$ ?

$r = \frac{1}{2}$. $\qquad a_n = r\,a_{(n-1)}$.

$$a_n = a_1 r^{(n-1)}$$

$$a_{10} = 100\left(\frac{1}{2}\right)^9 = 0.1953125.$$

$$S_{\infty} = \frac{a_1}{1-r} = \frac{100}{1-\frac{1}{2}} = 200.$$

4. A. $r_e = APY = \left(1+i\right)^m - 1$

$i = 0.01$

$m = 52$

$APY = (1.01)^{52} - 1 = 0.6777 = 67.77\%$

B. $A = P(1+i)^n$

$A = 500(1.01)^{26} = \$647.63.$

C. $A = P(1+i)^n$

$2P = P(1+i)^n$

$2 = (1+0.01)^n$

$\ln 2 = \ln(1.01)^n = n \ln(1.01)$

$n = \dfrac{\ln 2}{\ln(1.01)}$

$nt = \dfrac{\ln 2}{\ln(1.01)}$

$t = \left(\dfrac{1}{52}\right)\dfrac{\ln 2}{\ln(1.01)} = 1.34 \text{ yrs.}$

$= 1 \text{ yr. } 18 \text{ weeks.}$

$= 70 \text{ weeks.}$

5. $$FV = PMT\left(\frac{(1+i)^{n}-1}{i}\right)$$

$PMT = \$100$
$r = 0.06$
$m = 12$
$\Rightarrow i = \frac{r}{m} = \frac{0.06}{12} = 0.005.$

A. First year ($t=1$):

$$FV = 100\left(\frac{(1.005)^{12}-1}{0.005}\right) = \$1,233.56.$$

Interest $= (1233.56) - (100)(12)$

$= \$33.56.$

B. Second year ($t=2$):

$$FV = 100\left(\frac{(1.005)^{24}-1}{0.005}\right) = \$2,543.20.$$

Interest $= (2543.20) - (33.56) - (100)(24)$

$= \$109.64.$

C. Third year ($t=3$):

$$FV = 100\left(\frac{(1.005)^{36}-1}{0.005}\right) = \$3,933.61.$$

$$\text{Interest} = 3933.61 - (33.56) - (109.64) - \frac{V}{(100)(36)}$$

$$= \$190.41.$$

6. (A)

Future value in 2 years for \$6000 is:

$$FV = 6000\left(1+\frac{0.035}{12}\right)^{24}$$

$$= 6434.393$$

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

$n = 48 \qquad i = \frac{0.035}{12} = 0.00292$

$PV = 6434.393$ Then

$PMT = 143.8587$

total payments made $= 48 \times 143.8587$

(B) Total interest $= 48 \times 143.8587 - 6000$

$= \$905.2176$