MATH 208 - Fall 2015.
Mid. Exam SOLUTION

1-a) $m = \frac{450-480}{1500-1200} = -0.1$

$480 = -0.1(1200) + b \Rightarrow b = 600$

$p(x) = -0.1x + 600$

b) $R(x) = x(-0.1x + 600)$, vertex $= -\frac{b}{2a} = 3000$

$p(3000) = -0.1(3000) + 600 = \$300$

Rebate $= 480 - 300 = \$180$

2-a) $7^{x^2+x-9} = 7^{3(-3x+5)} = 7^{-9x+15}$

$x^2 + x - 9 = -9x + 15 \Rightarrow x = -12, 2$

b) $\log_2 (x-3)(2x-4) = \log_2 2^2$

$(x-3)(2x-4) = 4 \Rightarrow x = 4, 1$

c) $e^{x^2-2x+5} = e^{-\frac{1}{4}(-8x^2+12x+28)}$

$x^2 - 2x + 5 = -\frac{1}{4}(-8x^2 + 12x + 28) \Rightarrow x = 4, -3$

d) $\log_4 (x^2+x+4) = 2 = \log_4 4^2$

$x^2 + x + 4 = 4^2 \Rightarrow x = 3, -4$

3- a) $\begin{cases} a_1 + 7d = 9 \\ a_1 + 18d = -24 \end{cases} \Rightarrow a_1 = 30, d = -3$

$a_{50} = -117, \quad S_{61} = -366$

b) $r = -1/4, \quad S_\infty = 2/1-(-\frac{1}{4}) = \frac{8}{5} = 1.6$

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Mid SOLUTION CONT'd

4- Annual Interest rate $= \frac{.29}{500} \times 365 = 0.2117$

Total paid $= 1500 + 3 \times .29 \times 120 = 1604.40$

5- a) $PMT = FV\left(\frac{i}{(1+i)^n - 1}\right) = 5000000\left(\frac{.0135}{(1+.0135)^{40} - 1}\right) = 95094.65$

b) $FV_{9Yrs} = PMT\left(\frac{(1+0.0135)^{36} - 1}{0.0135}\right) = 4370991.06$

Balance $= 5000000 - FV_{9Yrs} = 629008.94$

Interest $=$ balance $- 4PMT = 248630.38$

6- a) $PV = PMT\left(\frac{1 - (1 + \frac{.08}{4})^{-2\times4}}{.0814}\right) = 7325.48$

b) $PV = 1000\left(\frac{1 + (1+i)^{-3\times4}}{i}\right) = 10575.34$

Interest in the 5th year

$10575.34 - 7325 - 1000 \times 4 = -749.66$

Interest $= \underline{749.66}$