MATH100  
quizz #3, 4/07/10  
topics to be covered  

1.  
   - $r$ – the annual interest rate compounded monthly  
   - $i = \frac{r}{12}$ – the monthly interest rate  
   - $N$ – life of the loan in months  
   - $P$ – the principal  

\[ P(1 + i)^N = d \frac{(1 + i)^N - 1}{i} \]

hence

\[ d = \frac{Pi}{1 - (1 + i)^{-N}}, \quad \text{and} \quad P = \frac{1 - (1 + i)^{-N}}{i}. \]

2. Payments towards interest and principal at the end of $n$th month.

<table>
<thead>
<tr>
<th>interest payment</th>
<th>$H_n = \left( P(1 + i)^n - d \frac{(1 + i)^n - 1}{i} \right) i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>principal payment</td>
<td>$C_n = d - H_n$</td>
</tr>
<tr>
<td>new principal balance</td>
<td>$Q_n = P(1 + i)^n - d \frac{(1 + i)^n - 1}{i}$</td>
</tr>
</tbody>
</table>

3. principal and interest on the loan,  

4. home equity.  

5. Binary to decimal and decimal to binary translations.  

6. Caesar and Vigenere ciphers.