Homework 2
Math 109 / Music 109A, Spring 2006

Due Monday, February 13.

(1) In $\frac{3}{4}$ time, give the duration in beats for:
   (a) a dotted sixty-fourth note
   (b) an eighth note with four dots
   (c) a half note tied to a quarter note with three dots

(2) In $\frac{12}{8}$ time, taken as a compound time signature, give the duration in beats for:
   (a) a dotted quarter note
   (b) a quarter note tied to a thirty-second note
   (c) a thirty-second note with two dots

(3) Prove the equation:

$$1 + r + r^2 + \cdots + r^m = \frac{1 - r^{m+1}}{1 - r}.$$ 

for any integer $m \geq 0$ and any real number $r \neq 1$. Hint: Consider the product $(1 - r)(1 + r + r^2 + \cdots + r^m)$. Explain how this relates to the durations of dotted notes.

(4) Notate and name the following tuplets:
   (a) that which divides the half note into 7 equal notes
   (b) that which divides the sixteenth note into 5 equal notes
   (c) that which divides the whole note into 11 equal notes

(5) Notate and give the total duration of:
   (a) a sixteenth note septuplet
   (b) a quarter note triplet

(6) Complete these measures with a single durational note:

(a) $\frac{3}{4}$\textsuperscript{--}\textsuperscript{--}\textsuperscript{--} \hspace{1cm} (b) $\frac{4}{4}$\textsuperscript{--}\textsuperscript{--}\textsuperscript{--} \hspace{1cm} (c) $\frac{8}{8}$\textsuperscript{--}\textsuperscript{--}\textsuperscript{--}
(7) Complete the following example three ways with a measure having the same rhythm,

\[ \begin{array}{cccccccc}
& \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\
& & & & & & & \\
& & & & & & & \\
\end{array} \]

employing, respectively:

(a) diatonic transposition up one scale tone

(b) diatonic transposition up three scale tones

(c) chromatic transposition up a minor third

Which of these, if any, represent both diatonic and chromatic transposition?

(8) Rewrite the example of (7) using only sixteenth notes and ties.

(9) For the refrain of the song Someone To Watch Over Me, by George Gershwin and Ira Gershwin, give the form (e.g., ABAC or ABA) by dividing the refrain into segments consisting of eight measures.

The song is in the book Music By Gershwin, which is on the shelf in Room 117. You may reference your discussion by numbering the measures, letting measure 1 be the first measure of the refrain.

(10) For the same refrain, locate transformations such as translation (melodic and/or rhythmic) and transposition (diatonic and/or chromatic), other than those that are dictated by the global form determined in (9).