For problems 1-3, let the ranges of variables be $R, G, B, H, L \in [0, 1]$ and $H \in [0, 360)$. For problems 4-5, the Bézier curves are degree three.

1. Let a color be specified with $R = 1.0$, $G = 0.5$ and $B = 0.5$. Express the color in HSL form.

2. Same as 1., but with $R = 0.0$, $G = 0.75$, $B = 0.5$.

3. Same as 1., but with $R = 0.25$, $G = 0.5$, $B = 0.25$.

4. A Bézier curve $q$ has control points $q_0 = (0, 0)$, $q_1 = (0, 1)$, $q_2 = (1, 1)$ and $q_3 = (2, 0)$.
   
   a. Graph the control points and the control polygon.
   
   b. Give a freehand sketch of the curve. Be sure to show the beginning and ending slopes clearly.
   
   c. What point is $q(0)$? $q(\frac{1}{2})$? $q(\frac{1}{3})$?
   
   d. What are the values of the derivatives $q'(0)$ and $q'(1)$?

5. Suppose a Bézier curve $q$ has $q(0) = (0, 1)$, $q(1) = (3, 0)$, $q'(0) = (3, 3)$, and $q'(1) = (-3, 0)$.
   
   a. What are the four control points of the curve?
   
   b. Draw a graph showing the control points, the control polygon and the Bézier curve.
Homework #4 Answers

1. \( H = 0, \ L = \frac{3}{4}, \ S = 1. \)
2. \( H = 144, \ L = \frac{3}{8}, \ S = 1. \)
3. \( H = 120, \ L = \frac{3}{8}, \ S = \frac{1}{3}. \)

4. 

\[
\begin{array}{c}
\text{q}_0 \\
\text{q}_1 \\
\text{q}_2 \\
\text{q}_3 \\
\end{array}
\]

\[
\begin{array}{c}
\text{c. q}(0) = (0, 0). \text{ q}(\frac{1}{2}) = (\frac{5}{8}, \frac{3}{4}). \text{ q}(\frac{1}{3}) = (\frac{8}{27}, \frac{2}{3}).
\end{array}
\]

\[
\begin{array}{c}
\text{d. q}'(0) = (0, 3). \text{ q}'(1) = (3, -3).
\end{array}
\]

5. 

\[
\begin{array}{c}
\text{a. q}_0 = (0, 1). \text{ q}_1 = (1, 2). \text{ q}_2 = (4, 0). \text{ q}_3 = (3, 0).
\end{array}
\]

\[
\begin{array}{c}
\text{b.}
\end{array}
\]