Ungraded Quiz - Homogenous coordinates

April 7, 2020

This is an ungraded quiz that you can use to test your understanding of homogenous coordinates. Please submit on CMS. Note: even if it is ungraded, submitting is useful not just for you (you will get to know the answer), but also for me (I will get to know where I need to slow down).

1. $\begin{bmatrix}3\\5\end{bmatrix}$ is a point in 2D represented in Euclidean coordinates. Which of the following is a representation of this point in homogenous coordinates?
   (a) $\begin{bmatrix}1\\3\\5\end{bmatrix}$
   (b) $\begin{bmatrix}6\\10\\1\end{bmatrix}$
   (c) $\begin{bmatrix}6\\10\\2\end{bmatrix}$
   (d) $\begin{bmatrix}6\\10\end{bmatrix}$
2. Consider the matrix $H = \begin{bmatrix}5 & 0 & 1\\0 & 5 & 1\\0 & 0 & 1\end{bmatrix}$. Let $\vec{\mathbf{p}}$ be the homogenous coordinates of a 2D point. What does multiplying $\vec{\mathbf{p}}$ with H do?
   (a) Translate
   (b) Scale
   (c) Scale and translate
   (d) Rotate and translate
3. Let $\vec{\mathbf{p}}$ be the homogenous coordinates of a 2D point. Let $\mathbf{l} = \begin{bmatrix}a\\b\\c\end{bmatrix}$. Consider the set of points $\vec{\mathbf{p}}$ such that $\mathbf{l}^T\vec{\mathbf{p}} = 0$. What does this represent?

(a) A plane

(b) A line

(c) A circle

(d) None of the above