CS3241 Computer Graphics Pre-course Test

1. Given a line segment with two end points ***a***:(1,9) and ***b***:(8,2).

   a. What is its intersection with the line $y = 4$?

   Answer: (6,4)

   b. If point ***c*** is on the line segment ***ab*** and ***ac***:***cb*** = 5:2, what is the coordinates of ***c***?

   Answer: ***c*** = (6,4)

2. Compute $\begin{bmatrix} 1 & 0 & a \\ 0 & 1 & b \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$.

   Answer: $\begin{bmatrix} x+a \\ y+b \\ 1 \end{bmatrix}$

3. Given a variable t, and let $p(t) = (0, 5, 3+t)$. If $p(t)$ is on the plane $2x-3y+z=5$. What is the coordinate of $p(t)$?

   Answer: $t = 17$, $p(t) = (0,5,20)$

4. Expand $\sum_{i=0}^{3} \binom{n}{i} s^i$ (or also can be written as $\sum_{i=0}^{3} {}_nC_i s^i$).

   Answer: $s^3 + 3s^2 + 3s + 1$

5. Given an equation $Q(s,t) = s^2t + 3st + 7t^2$, compute $\frac{\partial Q}{\partial s}$ and $\frac{\partial Q}{\partial t}$.

   Answer: $\frac{\partial Q}{\partial s} = 2st + 3t$, $\frac{\partial Q}{\partial t} = s^2 + 3s + 14t$

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