

Quiz 3

Date : November 5, 2013, Total time : 30 minutes, Total points : 20 points.

Name: _____ Reg.No.: _____

1. Find

$$\left(\frac{3}{5}\mathbf{i} + \frac{4}{5} \left(\frac{5}{13}\mathbf{j} + \frac{12}{13}\mathbf{k} \right) \right)^2.$$

2 points.

2. In \mathbb{RP}^2 , what is the line passing through the points $(1 : 0 : 2)$ and $(0 : 1 : 1)$?

4 points.

3. What is the point of intersection of the lines $X + 2Z = 0$ and $Y + Z = 0$ in \mathbb{RP}^2 ?

1 point.

4. Take a deep breath.

0 point.

5. Consider the coordinates in the X-Y plane :

$$A = (0, 2, 0) \quad B = (-1, 1, 0) \quad C = (0, 0, 0) \quad D = (1, 1, 0)$$

$$E = \left(-\frac{1}{2}, \frac{3}{2}, 0\right) \quad F = \left(-\frac{1}{2}, \frac{1}{2}, 0\right) \quad G = \left(\frac{1}{2}, \frac{3}{2}, 0\right) \quad H = \left(\frac{1}{2}, \frac{1}{2}, 0\right).$$

Consider the figure obtained by joining the line AB, BC, CD, DA and EF and GH .

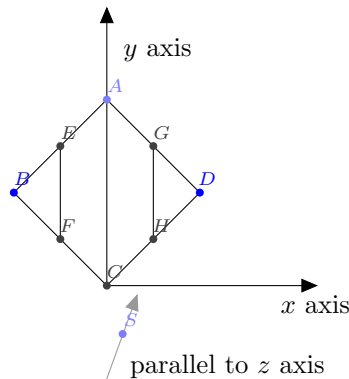


FIGURE 1. Figure for problem 5

5a. Let $S = (0, -1, 1)$. Find the projection of the figure $ABCD$ on the $X - Z$ plane ($Y = 0$). Suppose the projections of the points A, B, C and D are A', B', C' and D' respectively.

5b. Find $\overleftrightarrow{A'B'} \cap \overleftrightarrow{C'D'}$ and $\overleftrightarrow{A'C'} \cap \overleftrightarrow{B'D'}$.

4 points.

5c. Can you describe the line where these two intersections lie in terms of projective plane?

8 points.

1 point.

Problem to muse about on the way home: Can you guess, without computing, where $E'F' \cap G'H'$ will lie?

0 point.