

# Math 241

Quiz 2 Sample  
February 5, 2008

Show any calculations that you do on the quiz paper.

1. Let  $\mathcal{P}$  be the plane determined by the non-collinear points  $P_1 = (1, 0, 1)$ ,  $P_2 = (0, 1, 1)$ , and  $P_3 = (2, 1, 0)$  and let  $\mathcal{L}$  be the line passing through the points  $Q_1 = (0, 0, -2)$  and  $Q_2 = (2, 2, 2)$ .
  - (a) What calculations would you do to determine whether  $\mathcal{P}$  and  $\mathcal{L}$  are perpendicular? (Write out the process briefly in words, don't do any calculations yet.)
  - (b) Use your method from (a) to determine whether  $\mathcal{P}$  and  $\mathcal{L}$  are perpendicular. (Now do the calculations.)
2. Let  $\alpha : \mathbf{R} \rightarrow \mathbf{R}^2$  and let  $\beta : \mathbf{R} \rightarrow \mathbf{R}^2$  be differentiable parametrizations. Prove the sum rule for derivatives of parametrizations:

$$(\alpha(t) + \beta(t))' = \alpha'(t) + \beta'(t).$$

3. Give a counterclockwise parametrization  $\alpha$  of the circle of radius 1 centered at the point  $(2, 0)$  in the plane so that  $\alpha(0) = (3, 0)$  and  $\alpha(\frac{\pi}{2}) = (1, 0)$ . (Hint: It is not necessary, but you might find it helpful to sketch the image of  $\alpha$  and label certain points on the image.)