MATH 2350: CALCULUS III

Spring 2011, Sections 002 & 004

Hints for Mid Term Test # 1 – Take Home Portion

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1. (a) Page 622, problem 54 and its solution provided (homework 2 solutions – last page)
   (b) Page 622, problem 54 and its solution provided (homework 2 solutions – last page)
   (c) First of all, note that these plane are not parallel. So, they must intersect. The intersect along an entire line; we are asked to find just one point on this line of intersection.
   The easiest method is to make a *clever guess* ! We cannot really "solve" the two equations to find one point.
   First note that plane $\mathbb{P}_1$ has no 'y' term. We can us this fact for our advantage.
   Since both planes have x and z terms, and the x term has the largest coefficients, set $x = 0$. Then, we can easily solve the first plane for z.
   Note that we have two coordinate points: x (= 0, by assumption) and z (you found before). Now plug those to values in the equation of the second plane and solve for y.
   All what's left is to verify that the (x,y,z) satisfy the equations of both planes!
   (d) The solution to this problem can be achieved in two steps . . .
   Since the line of intersection of the two planes is common to both planes, it should be perpendicular to the normals of both planes. Use this fact to find the direction vector $\boldsymbol{v}$ of the line.
   You have already found a point on this line in the previous section, so you have all the data to find the equation of the line!

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2. (a) The idea is similar to problem 8 in page 614.
   (b) Recall that given a point (r, θ) in polar coordinates, we can write the rectangular Cartesian coordinates using the transformations $x = r\cos\theta$ and $y = r\sin\theta$
   (c) $\boldsymbol{R}'(t)$ . . . , where $\boldsymbol{R}(t) = r_1(t)\boldsymbol{i} + r_2(t)\boldsymbol{j}$
   (d) I want you to read page 654 and 655 of the text. See the box given in page 655 for the general formula, and the worked example in my notes (note 5 - page 2 - last example)
   (e) I want you to read page 654 and 655 of the text. See the box given in page 655 for the general formula, and the worked example in my notes (note 5 - page 2 - last example)
   (f) Something like $\|\boldsymbol{R}(t)\|$
   (g) Limits of $\boldsymbol{R}(t)$, $\boldsymbol{v}(t)$, $\boldsymbol{a}(t)$, as $t \to \infty$.

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3. Hints are already provided in the question itself.
