Homework 1, due 13:45 Wednesday, 20 September 2017

You must justify your answers to receive full credit.

Please draw on **plain paper (without lines)** with a **pencil or erasable pen.**

- 10.2: Q22, 23. (Hint: solve a system of linear equations).
- 10.4: Q4, 5. (Hint for 5: suppose the equation of the plane is $Ax + By + Cz = D$ and solve for A, B, C, D.)
- 10.4: Q15, 16: give the vector and scalar parametric form only.
- 10.1: Q27, 28: sketch the two surfaces in each question, clearly showing the intersection, and describe the intersection.
- 10.1: Q31, 32: sketch and describe the regions.
- 10.5: Q4, 6, 7, 13: if it's a hyperboloid, just say "it's a hyperboloid"; you don't need to decide whether it has one or two sheets, and you don't need to draw it.
- 12.1: Q2, 5, 7: describe and also sketch the domains.
- 12.1: Q12, 23, 25
- 12.1 Q38, 40: you don't need to sketch, just describe the surfaces.

1. Consider the surfaces
$$z = 1 - x^2 - y^2 \quad \text{and} \quad 2x - z = 4.$$

   a) Find two functions $F, G : \mathbb{R}^3 \to \mathbb{R}$ whose level sets are respectively these two surfaces.

   b) Describe and sketch the region bounded by the two surfaces, and give the inequalities that define it.

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