Homework 1, due 12:45 Monday, 6 February 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, 31, 32: for each question, sketch the two relevant surfaces on the same set of axes, then describe the required region.
- 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) Sketch the region bounded by the two surfaces, and describe it using inequalities.

2. (This question is to prepare you for the following week's class, and is unrelated to the material from recent classes.)
   a) Find $\frac{d}{dt} \cos t$.
   b) Find $\frac{d}{dx} \cos(x^3)$.
   c) Find $\frac{d}{dx} x e^x$.

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