Math 3214: HW3 (Due Wednesday 2/12, 5pm)

To obtain (full) credit, show all reasoning and work.

If you use a formula, include it in the write-up of that problem.

No calculator or other electronic devices for HWs.

1. Section 4.1: 24.
2. Section 4.1: 26 (Don't answer part 3: whether this is the case for planetary motion).
3. Section 2.6: 13.
4. Review exercises for Chapter 2 (p.145): 27.
5. Sketch AND parametrize the following surfaces using a single vector function $\mathbf{\Phi}$.
   Use either a graph, sphere, or surface of revolution parametrization.
   Include the bounds of the parameters in your parametrization.
   (a) Section 7.3: 19a. Use u and v: no z as in the back of the book.
   (b) Review exercises for Chapter 7 (p.424): 7a.
   (c) $x^2 + z^2 = 1$ in the first octant.
   (d) $x^2 + y^2 + z^2 = 4$ for $z \geq -1$,
   (e) $x^2 - 4y^2 + z^2 = 1$ for $-1 \leq y \leq 1$.
   (f) $x^2 + y^2 - 2z^2 = 0$ for $z \leq 1$.
   (g) $x - y + z = 1$ for $x \geq 0$ and $y \geq 0$.
   (h) $x^2 + y^2 + z^2 = 4$ for $0 \leq y \leq 1, \quad 0 \leq z \leq 1$, and for negative x.
6. Section 7.3: 1.
7. Section 7.3: 5.
8. Consider the surface S parametrized by $x = u^2 - v$, $y = u + v$, $z = u^2 + 4v$.
   (a) Find the equation of the tangent plane to S at the point where $(u, v) = (1, 1)$.
   (b) Determine whether S is regular.
9. Section 4.3: 3 (**By hand**: Plot several vectors along the lines $x = 0$, $y = 0$, $y = x$, and $y = -x$ so that you get a good representation of the vector field).
10. Section 4.3: 8 (**By hand**: Plot several vectors along the lines $x = 0$, $y = 0$, $y = x$, and $y = -x$ so that you get a good representation of the vector field).