Math 2934 homework

35. (12/2) 17.4 # 1, 5, 8, 11, 14, 22, 23, 27 (also tell why Green's Theorem does not show it must be zero for loops that *do* enclose the origin)

36. (12/2) 17.5 # 12

37. (12/2) As many as needed from 17.5 # 1-8, 13-18. Look at 17.5 # 23-29 and try a couple of them if you have time. Hand in 17.5 # 4, 7, 13, 14.

38. (12/7) 17.6 # 1, 2, 3 (write in the form $\vec{a}+u\,\vec{b}+v\,\vec{c}$), 4 (notice that $(x/2)^2+(y/3)^2=1$, so the points lie on the graph of this equation, and $0 \le z \le 2$), 5 (graph of a function), 6 (how does x^2+z^2 compare to y^2?), 19, 23, 24, 25, 37, 41, 54(a), 55(a)(c).

39. (12/7) For the following, work them to the point where they are expressed as ordinary double integrals on the parameter domain. Make reasonable simplifications, but do not go on to carry out the integration and obtain the actual answer (unless you want to do that just to practice integration). 17.7 # 7 , 8 (# 7 and 8 are cases of Formula 4), 9, 15 (for # 15, you can save a lot of time by making use of the standard parameterization of the sphere and taking as known the fact that $dS = a^2\sin(\phi)\,dR$), 17 (similarly to class example # 4, parameterize this surface as $(h, \cos(\theta), \sin(\theta))$, with (θ, h) in a rectangle in the θh-plane

40. (12/7) 17.7 # 37 (by symmetry, $\overline{x}=\overline{y}=0$. For $\overline{z}$, taking the density function to be 1, the mass is the area $2\pi a^2$. The moment with respect to the xy-plane is $\displaystyle\iint_S z\,dS$, which can be calculated easily enough using our standard coordinates and the known fact that $dS = a^2\sin(\phi)\,dR$), 38

41. 17.7 # 19 (graph of a function), 23 (note that $\vec{n} = -x/2\,\vec{\imath} - y/2\,\vec{\jmath} - z/2\,\vec{k}$) , 28 (the example from class)

42. 17.8 # 3 ($z=4$ on C, and the $\vec{k}$-component of $\vec{F}$ can be dropped since it is perpendicular to the tangent vectors of C), 6 ($x=0$ on C), 10 (similar to the example we did in class), 15 (notice that you can swap S for the unit disk in the xz-plane), 16 (remember that $\int_C z\,dx - 2x\,dy + 3y\,dz = \int_C (y\,\vec{\imath}+z\,\vec{\jmath}+x\,\vec{k})\cdot d\vec{r}$, $\operatorname{curl}(y\,\vec{\imath}+z\,\vec{\jmath}+x\,\vec{k})$ works out to be a constant vector field, the normal to the plane is $\vec{n} = (1/\sqrt{3})(\vec{\imath}+\vec{\jmath}+\vec{k})$, now use $\iint_S \operatorname{curl}(y\,\vec{\imath}+z\,\vec{\jmath}+x\,\vec{k})\cdot d\vec{S} = \iint_S \operatorname{curl}(y\,\vec{\imath}+z\,\vec{\jmath}+x\,\vec{k})\cdot\vec{n}\,dS$)