Math 117: Study Guide for Test 3

Know how to:
- Parametrize surfaces for graph of a function, sphere, and “cylindrical” cases
- Compute $\frac{\partial \vec{r}}{\partial u} \times \frac{\partial \vec{r}}{\partial v}$ and $\left\| \frac{\partial \vec{r}}{\partial u} \times \frac{\partial \vec{r}}{\partial v} \right\|$
- Compute $\iint_{\sigma} f(x, y, z) \, dS$; for $\vec{r}(u, v)$, graph of a function, and spheres
- Use surface integrals to find surface area
- Find the positive orientation on a parametrized surface
- Compute the flux $\Phi = \iint_{\sigma} (\vec{F} \cdot \vec{n}) \, dS$; for $\vec{r}(u, v)$, graph of a function, and spheres
- Compute the divergence of a vector field
- Use Gauss’ Divergence Theorem to compute $\iint_{\sigma} (\vec{F} \cdot \vec{n}) \, dS$, for closed surfaces

Be Able to STATE:
- Gauss’ Divergence Theorem

Practice Problems:
- Page 1053 #3, 6a, 25, 42, 43
- Page 1153 #5, 7, 8, 33
- Page 1163 #5, 10, 13, 16
- Page 1110 #16 (div only)
- Page 1172 #8, 10, 15
- Page 1182 #24, 27

Answers to Even Numbered Problems
- Page 1045: 6a. $x = u, y = 1 - u, z = v; -1 \leq v \leq 1, \quad 42. \frac{\sqrt{2}}{12} \pi^2$
- Page 1153: 8. $\frac{8}{3} \pi a^4$
- Page 1163: 10. $4\pi$, 16. $8\pi$
- Page 1110: 14. $\text{div } \vec{F} = ye^y + \sin y + 2 \sin z \cos z$
- Page 1172: 8. $\frac{3\pi}{2}$, 10. $\frac{1}{24}$
- Page 1182: 24. $\sqrt{10\pi}$

Study your class notes and homework. Good luck on Friday!