MATH 353 Handout #6

1. Evaluate $\oint_{\mathcal{C}} x^2y^2\ dx + 4xy^3\ dy$ where $\mathcal{C}$ is the triangle with vertices $(0,0)$, $(1,3)$ and $(0,3)$, oriented positively.

2. Evaluate $\int_{\mathcal{C}} \mathbf{F} \bullet d\mathbf{r}$ where $\mathbf{F}(x,y) = \langle \sqrt{x} + y^3, x^2 + \sqrt{y}$ and $\mathcal{C}$ consists of the arc of the curve $y = \sin x$ from $(0,0)$ to $(\pi, 0)$.

3. Evaluate $\int\int_{\mathcal{S}} curl\mathbf{F} \bullet d\mathbf{S}$ where $\mathbf{F}(x,y,z) = yz, xz, xy$ and $\mathcal{S}$ is the part of the paraboloid $z = 9 - x^2 - y^2$ that lies above the plane $z = 5$, oriented upward.

4. Evaluate $\int_{\mathcal{C}} \mathbf{F} \bullet d\mathbf{r}$ where $\mathbf{F}(e^{-x}, e^x, e^z)$ and $\mathcal{C}$ is the boundary of the part of the plane $2x + y + 2z = 2$ in the first octant.

5. Calculate the flux of $\mathbf{F}(x,y,z) = \langle 4x^3z, 4y^3z, 3z^4 \rangle$ out of the sphere $\mathcal{S}$ with radius R centered at the origin.

6. Evaluate $\int_{\mathcal{C}} \mathbf{F} \bullet N ds$ where $\mathbf{F}(x,y) = \langle -y, x \rangle$ and $\mathcal{C}$ is the unit circle, oriented positively.