Math 151, Quiz # 11, December 3, 2013

1. Compute $\int_0^{2\pi} \sin(x)\, dx$. **Solution:** The antiderivative of $\sin(x)$ is $-\cos(x)$. So $\int_0^{2\pi} \sin(x)\, dx = \cos(x)|_0^{2\pi} = \cos(2\pi) - \cos(0) = 1 - 1 = 0$.

2. Compute $\int \sin(x)\cos(x)\, dx$. **Solution:** Let $u = \sin(x)$. Then $du = \cos(x)dx$. So $dx = \dfrac{du}{\cos(x)}$. Thus, $\int \sin(x)\cos(x)\, dx = \int u\, du = \dfrac{1}{2}u^2 = \dfrac{1}{2}\sin^2(x)$.

3. Compute $\int_0^4 (2-x)^8\, dx$. **Solution:** Let $u = 2 - x$. Then $du = -dx$. This changes the bounds from $0 \to 2$ and $4 \to -2$. So the integral becomes $\int_2^{-2} -u^8\, du = \int_{-2}^{2} u^8\, du = \dfrac{u^9}{9}\Big|_{-2}^{2} = \dfrac{512}{9} + \dfrac{512}{9} + = \dfrac{1024}{9}$. This problem can be tricky what with all the minus signs. But notice that we know the answer must be positive since we are integrating the function $(2-x)^8$ which is always non-negative.