MAT 21B, Spring 2019
Solutions to homework 3

Section 5.5: 48. (10 points) Compute $\int x^5\sqrt{x^3+1}dx$.

Solution: Let $u = x^3+1$, then $du = 3x^2dx$ and $x^3 = u-1$. Then

$$\int x^5\sqrt{x^3+1}dx = \int x^3\sqrt{x^3+1}\cdot x^2dx = \int (u-1)\sqrt{u}\cdot(\frac{1}{3}du) =$$

$$\frac{1}{3}\int (u-1)\sqrt{u}du = \frac{1}{3}\int (u^{3/2}-u^{1/2})du = \frac{1}{3}(\frac{2}{5}u^{5/2}-\frac{2}{3}u^{3/2})+C =$$

$$\frac{2}{15}(x^3+1)^{5/2}-\frac{2}{9}(x^3+1)^{3/2}+C.$$

Section 5.6: 16. (10 points) Compute $\int_1^4 \frac{dy}{2\sqrt{y}(1+\sqrt{y})^2}$.

Solution: Let $u = 1+\sqrt{y}$, then $du = \frac{dy}{2\sqrt{y}}$, and

$$\int_1^4 \frac{dy}{2\sqrt{y}(1+\sqrt{y})^2} = \int_2^3 \frac{du}{u^2} = \frac{-1}{u}|_2^3 = -\frac{1}{3}+\frac{1}{2} = \frac{1}{6}.$$

50. (10 points) Compute $\int_0^\pi (1-\cos x)\sin x dx$.

Solution: Let $u = 1-\cos x$, then $du = \sin x dx$ and

$$\int_0^\pi (1-\cos x)\sin x dx = \int_0^2 u du = \frac{u^2}{2}|_0^2 = 2.$$