21-120: Differential and Integral Calculus
Recitation #25 Outline: 12/03/24

1. Evaluate each indefinite integral.

   (a) $\displaystyle\int e^{2y}\sin(2y)\,dy$ (b) $\displaystyle\int t\tan^2 t\,dt$

2. Evaluate each definite integral.

   (a) $\displaystyle\int_0^{1/2} x\cos\pi x\,dx$ (b) $\displaystyle\int_1^{\sqrt{3}} \arctan\left(\frac{1}{\theta}\right)d\theta$

3. (a) Show that
$$\int \sin^n x\,dx = -\frac{1}{n}\cos x\sin^{n-1}x + \frac{n-1}{n}\int \sin^{n-2}x\,dx$$
   where $n \geq 2$ is an integer.

   (b) Use the previous part to show that
$$\int \sin^2 x\,dx = \frac{x}{2} - \frac{\cos x\sin x}{2} + C.$$

   (c) Use the previous two parts to evaluate $\displaystyle\int \sin^4 x\,dx$.