

MATH 122: Calculus II  
Hints and Answers for Assignment 15

**I: Section 7.1: 37, 48, 53**

**Exercise 37:** Use integration by parts on  $\int \arccos x dx$  with  $u = \arccos x$ ,  $dv = dx$ . Answer is  $x \arccos x - \sqrt{1-x^2} + C$

**Exercise 48:** Work =  $\int_0^1 x^5 \sqrt{x^3+1} dx$ . Write integrand as  $(x^3)(x^2(x^3+1)^{1/2})$  and use integration by parts. Work equals  $\frac{4}{45}(\sqrt{2}+1)$ .

**Exercise 53:** The argument treats  $\int \frac{1}{x} dx$  as if it were a **number** when in fact it is a set of functions.

**II: Section 7.2: 13, 17, 21**

**Exercise 13:**  $\int \tan^6 x dx$

. Use the identity  $\tan^2 x = \sec^2 x - 1$  and  $(\tan x)' = \sec^2 x$  :

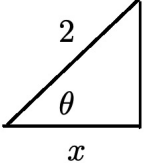
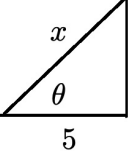
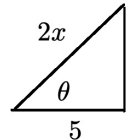
$$\int \tan^6 x dx = \frac{1}{5} \tan^5 x - \frac{1}{3} \tan^3 x + \tan x - x + C.$$

**Exercise 17:**  $\int (\tan x + \cot x)^2 dx = \int \tan^2 x + 2(\tan x)(\cot x) + \cot^2 x dx = \int \tan^2 x + 2 + \cot^2 x dx$   
 $= \int (\tan^2 x + 1) + (\cot^2 x + 1) dx$

**Exercise 21:** Observe that  $\sin^3 x = (\sin^2 x)(\sin x) = (1 - \cos^2 x)(\cos x)'$  and try the substitution  $u = \cos x$ . Answer is  $\frac{5\sqrt{2}}{2} + \frac{2}{3}$

**III: Section 7.3: 1, 6, 10**

Here are some useful pictures:

 <p>Exercise 1: <math>\int \frac{1}{x\sqrt{4-x^2}} dx</math></p>	 <p>Exercise 6: <math>\int \frac{1}{x^3\sqrt{x^2-25}} dx</math></p>	 <p>Exercise 10: <math>\int \frac{1}{\sqrt{4x^2-25}} dx</math></p>
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**Exercise 1:**

$$= -\frac{1}{2} \ln \left| \frac{2}{x} + \frac{\sqrt{4-x^2}}{x} \right| + C = -\frac{1}{2} \ln \left| \frac{2 + \sqrt{4-x^2}}{x} \right| + C$$

**Exercise 6:**

$$\frac{1}{250} \left( \operatorname{arcsec} \left( \frac{x}{5} \right) + \left( \frac{\sqrt{x^2-25}}{x} \right) \left( \frac{5}{x} \right) \right) + C$$

**Exercise 10:**

$$\frac{1}{2} \ln \left| \frac{2x + \sqrt{4x^2-25}}{5} \right| + C$$