

## LECTURE SUMMARY 2.2

FRIDAY, MAY 13, 2016

### PART I

1. Differences and similarities between type I and type II Improper integral.
2.  $\lim_{b \rightarrow +\infty} \frac{b^{1-p}}{1-p}$ .
3. why  $\int_0^1 \frac{1}{x} dx$  diverges, while  $\int_0^1 \frac{1}{\sqrt{x}} dx$  converges.
4. Definition of Average Value of a continuous function.
5. Table of Trigonometric substitution.

Table of Trigonometric Substitution		
Expression	Substitution	Identity
$\sqrt{a^2 - x^2}$	$x = a \sin \theta, -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$	$1 - \sin^2 \theta = \cos^2 \theta$
$\sqrt{a^2 + x^2}$	$x = a \tan \theta, -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$	$1 + \tan^2 \theta = \sec^2 \theta$
$\sqrt{x^2 - a^2}$	$x = a \sec \theta, 0 \leq \theta < \frac{\pi}{2}$ or $\pi \leq \theta < \frac{3\pi}{2}$	$\sec^2 \theta - 1 = \tan^2 \theta$

6. Key for trigonometric substitution: get rid of square root via substitution.

### PART 2: INTEGRATION OF RATIONAL FUNCTIONS BY PARTIAL FRACTIONS

1. Definition of Rational Function.
2. Mathematical view of generalization.
3.  $\int \frac{1}{x-a} dx$ , for any constant  $a$ .
4.  $\int \frac{1}{x(x-1)} dx$ .
5. For more examples, see problem set 2.2.