

## Test 1 Study Guide

### Section 7.1

- Know the midpoint, trapezoid, and Simpson's rules; be able to "plug-n-chug".
- Know how to find a suitable  $K \geq |f''(x)|$  for the error bounds for the midpoint and trapezoid rules (like #28 and 29 on pg. 425, and the example from class).

### Section 7.2

- $\int u \cdot dv = uv - \int v \cdot du$
- "Like a circle" problems (eg)  $\int (e^x \cdot \sin x) dx$
- The  $dv=dx$  trick (eg)  $\int (\ln y) dy$

### Section 7.3

- Know the strategies given in the summary on pgs. 437 and 438.
- Trig. identities.

### Section 7.4

- Know the strategies on pg. 445.
- Don't forget to plug in  $dx = (a \cos \theta) d\theta$ , or  $dx = (a \sec^2 \theta) d\theta$ , etc. when appropriate.
- Don't forget to use the triangle to put things back in terms of  $x$ !

### Section 7.5

- $\sinh x = \frac{e^x - e^{-x}}{2}$ ,  $\cosh x = \frac{e^x + e^{-x}}{2}$ .
- Hyperbolic trig. substitution (see assigned textbook exercises).

### Section 7.6

- (eg.)  $\frac{p(x)}{(x-c)^n} = \frac{A_1}{(x-c)} + \dots + \frac{A_n}{(x-c)^n}$ .
- (eg.)  $\frac{p(x)}{(x^2+6)^n} = \frac{A_1x+B_1}{(x^2+6)} + \dots + \frac{A_nx+B_n}{(x^2+6)^n}$ .
- Long division of polynomials.
- $\int \frac{1}{x^2+a^2} = \frac{1}{a} \arctan\left(\frac{x}{a}\right) + C$ .

### Section 7.7

- An improper integral converges if the limit exists (and is finite), and diverges otherwise.
- "p-test" for convergence (ie)  $\int_1^{\infty} \frac{1}{x^p} dx$  converges if and only if  $p > 1$ .
- Comparison theorem problems (like #'s 65-73 odd pg. 475).