



(12) 5. Verify that  $\int_0^1 \frac{1}{\sqrt{9x^2 + 16}} dx = \frac{1}{3} \ln 2$ .

(10) 6. Find  $\int \frac{1+x+x^2}{x(x+1)^2} dx$ .

(12) 7. Verify that  $\int_0^{\pi/3} 3(\cos x)^2 - (\cos x)^3 dx = \frac{\pi}{2}$ .

**Hint** Do them separately!

(13) 8. Here  $f(x) = \frac{1}{1+x^2}$ .

a) Write the Trapezoid Rule approximation for  $\int_1^5 f(x) dx$  with  $n = 4$  subintervals. No arithmetic needs to be done, *but* all function evaluations should be performed (therefore an expression like  $f(3)$  should not appear in the final answer).

b) Compute  $f''(x)$ . Find some overestimate of  $|f''(x)|$  if  $x$  is in the interval  $[1, 5]$ . (Please do *not* “simplify” your answer!)

**Comment** You are *not* asked for the “best possible” estimate. Get some number with some justification. Realize that  $\text{MAX}(\frac{TOP}{BOTTOM}) \leq \frac{\text{MAX}(TOP)}{\text{MIN}(BOTTOM)}$ .

c) The true value (to 5 decimal places) of  $\int_1^5 f(x) dx$  is .58800. Find  $N$  so that the Trapezoid Rule approximation for the integral is within .001 of the true value. (Please do *not* “simplify” your answer!)

# First Exam for Math 152H

October 8, 2009

NAME \_\_\_\_\_

**Do all problems, in any order.**

**Show your work. An answer alone may not receive full credit.**

**No texts, notes, or calculators other than the  
formula sheet may be used on this exam.**

Problem Number	Possible Points	Points Earned:
1	16	
2	12	
3	10	
4	15	
5	12	
6	10	
7	12	
8	13	
Total Points Earned:		

**Find exact values of standard functions such as  $e^0$  and  $\sin\left(\frac{\pi}{2}\right)$ .**

**Otherwise do NOT “simplify” your numerical answers!**