

Name: Grading Guide

Each problem is worth the indicated number of points. Show all your work for full credit; numerical or graphical estimates are unacceptable unless specifically requested. You may work one bonus problem; if you work more than one I will only grade the first one.

1. (20 pts) Find the indefinite integral:

$$\int \frac{4x^3 - 6x^2 + x - 2}{x^2(x^2 + 1)} dx$$

- 8 Does pfrac & nothing else  
 - see backs an integral  
 -6 does  $\int f/g = \int f/g$  or similar  
 -3 minor alg: multiplies numer alg  
 -6  
 +3 Doesn't see to use pfrac,  
 does some correct algebra, doesn't  
 get anywhere.  
 -1 Transcription error.  
 -6 Confuses generic pfrac slightly;  
 wrong coeffs etc.  
 -4 Sets up pfrac OK; solves the  
 system incorrectly but all  
 resulting integrals look OK.

2. (10 pts) Find the definite integral:

$$\int_1^{\infty} \frac{1}{x^2} dx$$

-4  $\int \frac{1}{x^2} dx = \ln x^2$

-1 sign error

-2  $\int \frac{1}{x^n} dx = \frac{-1}{x^{n-1}}, n \in \mathbb{Z} \Rightarrow 2$

-2 Props a lim early

~~3~~ Doesn't treat as an improper integral.  
3

3. (10 pts) Find the indefinite integral:

$$\int e^{2x} \sin x dx$$

- 1 Sign error
  - 4 Doesn't use parts @ twice
  - 1 Doesn't handle constant in exp. properly
  - 3 Uses parts twice but doesn't show
  - 2 minor alg-
  - 2 Better minor diff. slightly
  - 1 no + C
  - 2 Applies parts wrong
- 
- 21 Does some double/hats angle formulas in (b), doesn't get anywhere

4. (15 pts) Find the indefinite integral:

$$\int \csc^{10} \theta d\theta$$

- 2 Doesn't do reverse subs
- 3 Barks props exps.
- 4 Expands with pythid & binom but forgets to leave out a  $du$
- 6 Leaves out  $\csc^2 \theta$  for  $-du$  but doesn't do pythid or binom
- 3 Misc. alg
- 4 major alg
- +1 Writes down some properties of exps but no further
- +5 As above but leaves off a  $\csc^2 \theta$

- 
- 2 Applies redux when  $n=2$  & gets  $\frac{n-2}{n-1} \neq 0$
  - 4 Screws up some coeffs in redux
  - 4 Doesn't apply redux till termination
  - 3 Applies till  $n=2$  but barks (screws) do
  - 2 Screws up 1 coeff

5. (15 pts) Find the definite integral:

$$\int_{-1}^1 \sqrt{1-x^2} dx$$

-2 Doesn't change a/b at right times but ends up OK

-4 As above but NOK

-6 Subs  $x = \sin \theta$  but works for rest of the details

-5 Gets to  $\int \cos^2 \theta d\theta$

-4 Uses  $x = \sec \theta$

-5 Doesn't change L&B no antider

-3 no antider

+4 Attempts rule

-14  $\sqrt{A-B} = \sqrt{A} - \sqrt{B}$

6. (15 pts) Use Simpson's Rule with  $n = 8$  to approximate

$$\int_{-1}^1 \sqrt{1-x^2} dx$$

- Leaves out  $\Delta x$  13
- 4 generally
  - 2 in final comp
  - 3 Does  $\Delta x$ , not  $\Delta x/3$
  - 4 Does some weird fraction in front not involving  $\Delta x$
  - 5 Random junk in the sum
  - 4 Borks the  $x$ 's

7. (15 pts) Find the area inside the curve given in polar coordinates by  $r = 1 + \cos \theta$

- 2 wrong ab
- 7 leaves off the  $\frac{1}{2}$
- 1 sign error
- 2 Bad scaling factor in  $\int \cos 2\theta$
- 3 alg.
- 3 ~~3~~ burks the trig id or doesn't show it
- 1 " " slightly
- 07 Doesn't square anything
- 5 Doesn't use a trig id
- 6 ~~6~~ tries to use subs

8. (Bonus 10 pts) Prove the reduction formula:

$$\int \csc^n x dx = -\frac{1}{n-1} \cot x \csc^{n-2} x + \frac{n-2}{n-1} \int \csc^{n-2} x dx$$

16 Use parts or let + no pythod

12 ~~See~~ to use parts but better if

9. (Bonus 10 pts) Determine whether the integral is convergent:

$$\int_1^{\infty} \frac{x}{e^{2x^2} + 4} dx$$

+2 Anything nontrivial  
not involving the comparison thm

+3 Barts Comp Thm Totally

+6 Compares to something  
legit. but doesn't  
find the integral

