TA:_____ NAME:_____

*Instructions*: Show all of your work and clearly explain your answers. This is particularly important on problems with a numerical answer, to allow the possibility of partial credit. No books or written notes are allowed during the exam, but you may use your calculator. Also note that this exam should have 3 pages; please check that it does.

| Problem | 1 | 2 | 3 | 4 | 5 | Totals |
|---|---|---|---|---|---|---|
| Points | 20 | 20 | 20 | 20 | 20 | 100 |
| Score | | | | | | |

[1] (20 points)

(a) (This part is #32 on p. 535; 8 points.) Find the exact value of $\sin^{-1}(\sin(3\pi/4))$.

(b) (This part is like #7 on p. 542; 12 points.) Find the exact value of $g'(1)$, given $g(x) = \tan^{-1}(f(x))$, $f(1) = 2$ and $f'(1) = 3$.

[2] (20 points) (This problem is like #7, p. 566.) Assuming $n \neq -1$, use integration by parts to evaluate the following integral. An answer with no work gets no credit; you must show what you choose for $u$ and $dv$, what you get for $v$, etc:

$$\int x^n \ln(x)\, dx$$

[3] (20 points) (This problem is like #19, p. 585.) Use partial fractions to evaluate the following integral. Show all of your steps; an answer with no work gets no credit:

$$\int \frac{x+1}{x^3+x}\, dx$$

[4] (20 points) (This problem is like #23, p. 560.) Complete the square and then use a trig substitution to evaluate the following integral. Show what the integral becomes after completeing the square, and explicitly indicate what trig substitution you then use on the way to your final answer:

$$\int \frac{1}{x^2+6x+13}\,dx$$

[5] (20 points) (This is #52, p. 618.) Use a comparison to determine whether the following integral converges or diverges. Indicate what comparison you are using, and explain how you obtain your conclusion:

$$\int_1^\infty \frac{x^2-2}{x^4+3}\,dx$$