

*TEST 1**September 17th, 2008***Your Name:** _____**Directions:**

- a. You may NOT use your book or your notes or a calculator.
- b. Please ask for extra scrap paper if needed.
- c. Show all work. Unless otherwise noted, a solution without work is worth nothing.
- d. Circle your answers.
- e. You may use the table of integrals provided.
- f. Good Luck!

Score:

1. _____

2. _____

3. _____

4. _____

5. _____

Extra. _____

Total _____

1. (15pts)

a. Decompose the rational function

$$\frac{3x}{(x-1)(x+4)}$$

using partial fractions.

b. Give the form of the partial fractions decomposition of

$$\frac{3x}{(x-1)^2(x^2+2)(x+5)}$$

using A, B, C, \dots as constants. DO NOT FIND THE CONSTANTS!

2. (30pts) Compute the following integrals. You may use the table of integrals.

a. $\int \frac{\cos x}{\sqrt{\sin x}} dx$

b. $\int \sin^2(2x) \cos^3(2x) dx$

c. $\int_0^\pi y \cos y dy$

3. (30pts) Compute the following integrals. You may use the table of integrals on the first page of the test.

a. $\int \frac{1}{x^2+4x+6} dx$

b. $\int \frac{x^2}{x^2-3} dx$

c. $\int (\ln x)^2 dx$

4. (15pts)

a. Write the complex number $1 - i\sqrt{3}$ in the polar form $re^{i\theta}$. Give an exact answer and with exact angles in radians if possible.

b. Write the complex number $2e^{i(3\pi/2)}$ in the form $x + iy$. Please give an exact answer with radicals.

c. Show that

$$e^{it} + e^{-it} = 2 \cos t$$

for any real number t .

5. (10 pts) Suppose $f(0) = -2$, $f(2) = 5$, and $\int_0^2 f(t) dt = -3$. Compute the following.

a. $\int_0^1 f(2x) dx$

b. $\int_0^2 x f'(x) dx$

Extra Credit.

a. (5pts) Find

$$\int \sin(3 \ln x) dx.$$

b. (5pts) Show that

$$\cos 2x = \cos^2 x - \sin^2 x$$

$$\sin 2x = 2 \sin x \cos x$$

using complex exponentials ($e^{i\theta}$).