

**Name:** \_\_\_\_\_

**4-digit code:** \_\_\_\_\_

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has four (4) pages, including this one. The last one may be used as scratch paper.
- The test is fifty (50) minutes long.
- Enter your answer in the box(es) provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

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Page	Max. points	Your points
2	30	
3	30	
4	40	
<b>Total</b>	100	

**Problem 1** (25 pts). Evaluate  $\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{\sqrt{x^2+y^2}}^2 (x^2 + y^2) dz dy dx$ .

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**Problem 2** (25 pts). Evaluate  $\iiint_E xyz dV$ , where  $E$  lies between the spheres  $\rho = 2$ ,  $\rho = 4$  and above the cone  $\phi = \pi/3$ .

**Problem 3** (50 pts). Evaluate the given integral by making an appropriate change of variables, where  $R$  is the parallelogram enclosed by the lines  $x - 2y = 0$ ,  $x - 2y = 8$ ,  $3x - y = 1$  and  $3x - y = 9$ .

$$L = \iint_R \frac{x - 2y}{3x - y} dA$$



