

Sample Midterm Test 2

Time: 50 minutes

Instructor:

Dr. Edward Doolittle

Name: _____

Student #: _____

Section: _____

You have 50 minutes to do each of the following questions. Please check your work carefully. The test is worth a total of 50 marks.

Non-programmable calculators, logarithm tables, and/or slide rules are permitted; no other aids are permitted. Use the backs of the pages for rough work.

1. (10 marks) Find the following integral: $\int x^2 e^x dx$.

2. (10 marks) Find the following trigonometric integral: $\int_0^{\pi/2} \sin^5 x dx$.

3. Evaluate the following integral: $\int \frac{x-9}{(x+5)(x-2)} dx$.

4. (10 marks) Evaluate the integral $\int \sqrt{5+4x-x^2} dx$. You may find some of the formulas

$$\int \tan \theta d\theta = \ln |\sec \theta| + C$$

$$\int \sec \theta d\theta = \ln |\sec \theta + \tan \theta| + C$$

$$\int \sec^3 \theta d\theta = \frac{1}{2} \sec \theta \tan \theta + \frac{1}{2} \ln |\sec \theta + \tan \theta| + C$$

helpful.

5. (10 marks)

(a) Prove the reduction formula

$$\int \sin^n x \, dx = -\frac{1}{n} \cos x \sin^{n-1} x + \frac{n-1}{n} \int \sin^{n-2} x \, dx.$$

(b) Show that, for odd powers $2n + 1$ of sine, $\int_0^{\pi/2} \sin^{2n+1} x \, dx = \frac{2 \cdot 4 \cdot 6 \cdots 2n}{3 \cdot 5 \cdot 7 \cdots (2n+1)}$.