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MATH 152 Dr. Z. , Practice for Make-Up Exam I, Practice A4,

1. (10 points [5 each]) Find the following indefinite integrals

(a)

$$\int e^{2x} \cos 3x dx$$

(b)

$$\int \frac{1}{(x+2)(x+1)} dx$$

2. (10 points) The base of a solid is the region inside the curve $x^2 + y^2 = 1$. Each cross section of the solid perpendicular to the y -axis is a rectangle whose length is three times its width, with the width at the bottom. What is the volume of the solid?

3. (10 points, 4, 3, and 3 points resp.) Consider the curve $y = e^{2x}$, $0 \leq x \leq 2$. Set-up, but do not evaluate integrals for (a) its length (b) the area of the surface formed by rotating it about the y -axis (c) the area of the surface formed by rotating it about the x -axis

4. (10 pts) A cable that weighs 3 kilograms per meter is used to lift a 1000 kilograms load up a mineshaft 200 meters deep. Find the work done.

5. (10 points, 5 each) Determine whether each of the following integrals is convergent or divergent. Evaluate those that are convergent. Be sure to explain everything.

(a)

$$\int_1^{\infty} \frac{x^{10}}{(x^{11} + 1)^2} dx$$

(b)

$$\int_1^2 \frac{1}{(1-x)^3} dx$$

6. (10 pts) Find the average value, f_{ave} , of $f(x) = e^x$ on the interval $1 \leq x \leq 2$. Find a number c such that $f(c) = f_{ave}$.

7. (10 pts [6 for (a) and 4 for (b)]) Let

$$I = \int_1^2 x \, dx$$

- (a) Use the Trapezoid rule with $n = 4$ subdivisions find an approximation.
- (b) Estimate the error.

8. (10 points, 5 each) The region R is bounded by the curves $y = \sin 2x$ and $y = \cos 2x$ and the y axis for $0 \leq x \leq \pi/8$. Find the volume of the solid obtained by rotating R about the x -axis.

9. (10 pts) Find the values of r for which $y = e^{rt}$ satisfies the differential equation

$$y''' - 8y = 0 \quad .$$

10. (10 pts) The half-life of Rutgersium is 1 years. If right now you have a sample of 1024 kg, how long would it take for there to be only 1kg left? How much would be left after 20 years?