

1. Evaluate the integrals

(a)  $\int \frac{1}{1+8x} dx$

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

(c)  $\int \frac{1}{x(\ln x)^2} dx$

(d)  $\int \frac{e^x}{e^x+1} dx$

(e)  $\int_0^{\pi/3} \frac{1}{4+x^2} dx$

2. Differentiate

(a)  $a(x) = \sinh 4x$

(b)  $b(x) = \cosh(\cos x)$

(c)  $d(x) = \tanh 3x$

3. Find the area of the region bounded by the curves

(a)  $y = 1/x, y = x^2, y = 0, x = e$

(b)  $y = 1 - 2x^2, y = |x|$

(c)  $y = \sin x, y = \cos x$  for  $0 \leq x \leq 2\pi$

4. Integrate

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

(b)  $\int \frac{dx}{\sqrt{1-x^2}}$

5. Integrate

(a)  $\int_0^2 xe^x dx$

(b)  $\int_0^1 x^2 e^{-x} dx$

(c)  $\int_0^4 e^{\sqrt{x}} dx$

6. Find the volume of the solid obtained by rotating the region  $R$  bounded by  $y = e^x, y = 0, x = 0, x = 2$  about the  $x$ -axis using disks. Be sure to draw  $R$ .

7. Find the volume of the solid obtained by rotating the region  $R$  bounded by  $y = e^x$ ,  $y = 0$ ,  $x = 0$ ,  $x = 2$  about the  $y$ -axis using shells. Be sure to draw  $R$ .
8. Let  $R$  be the region bounded by  $y = \ln x$ ,  $y = 0$  and  $x = e^2$ . Set up the integrals to find the volume of the solid obtained by rotating the region  $R$  around the  $x$ -axis using
  - (a) disks
  - (b) shells
  - (c) Evaluate one of the integrals from part (a) and (b).
9.  $\int \tan x \, dx$
10.  $\int \sin^4(4x) \, dx$
11.  $\int_0^\pi \cos^2 x \, dx$
12. Repeat the previous problem using a different technique of integration.
13.  $\int_0^{\pi/2} \frac{\sec^2 x}{\tan x} \, dx$
14.  $\int \frac{dx}{x^2 + 2x + 5}$
15.  $\int \frac{dx}{1 + \cos x}$
16.  $\int \frac{2dx}{1 - x^2}$
17.  $\int \frac{2dx}{1 + x^2}$
18. Derive the integral in 16. using a trig substitution.
19.  $\int \cos(3x) \cos(7x) \, dx$
20.  $\int \cos^3 x \sin^2 x \, dx$
21.  $\int \sin^3 x \, dx$
22.  $\int \ln x \, dx$
23.  $\int \sqrt{16 - 4x^2} \, dx$

Helpful Equations you will be given for the exam:

$$\sin(a + b) = \sin a \cos b + \cos a \sin b$$

$$\cos(a + b) = \cos a \cos b - \sin a \sin b$$

$$\sin a \cos b = \frac{1}{2}(\sin(a - b) + \sin(a + b))$$

$$\sin a \sin b = \frac{1}{2}(\cos(a - b) - \cos(a + b))$$

$$\cos a \cos b = \frac{1}{2}(\cos(a - b) + \cos(a + b))$$

REMINDER:

EXAM I

WEDNESDAY, FEBRUARY 11, 2009

TIME: 9:00 AM TO 9:50 AM

LOCATION: CB 102

MATERIAL:

SECTIONS 3.11, 5.5, 6.1 THROUGH 6.3, 7.1 THROUGH 7.4

PLEASE REMEMBER TO BRING PHOTO ID TO THE EXAM.

NO CALCULATORS ARE ALLOWED FOR THE EXAM.