FINAL EXAM MATH 132 Spring 2010

Name:________________________________

NO CALCULATORS

ONE 4 × 6 NOTECARD ALLOWED

SHOW WORK & SIMPLIFY ANSWERS

$\int \sin x\,dx = -\cos x + C$
$\int \cos x\,dx = \sin x + C$
$\int \sec^2 x\,dx = \tan x + C$
$\int \tan x \sec x\,dx = \sec x + C$
$\int \csc^2 x\,dx = -\cot x + C$
$\int \cot x \csc x\,dx = -\csc x + C$
$\int \frac{1}{\sqrt{a^2-x^2}}\,dx = \sin^{-1}\left(\frac{x}{a}\right) + C$
$\int \frac{1}{a^2+x^2}\,dx = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C$
$\int \frac{1}{x\sqrt{x^2-a^2}}\,dx = \frac{1}{a}\sec^{-1}\left(\frac{x}{a}\right) + C$
$\int \sec x\,dx = \ln|\sec x + \tan x| + C$
$\int \sec^3 x\,dx = \frac{1}{2}(\sec x \tan x + \ln|\sec x + \tan x|) + C$

$\frac{1}{1-x} = 1 + x + x^2 + x^3 + \cdots$
$e^x = 1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \cdots$
$\sin x = x - \frac{1}{3!}x^3 + \frac{1}{5!}x^5 - \cdots$
$\cos x = 1 - \frac{1}{2!}x^2 + \frac{1}{4!}x^4 - \cdots$
$\ln(1-x) = -x - \frac{1}{2}x^2 - \frac{1}{3}x^3 - \cdots$

1	/10
2	/10
3	/10
4	/10
5	/10
6	/10
7	/10
8	/10
9	/10
10	/10
Total	/100

1. Evaluate the following definite integrals:

(a) $\int_0^{\pi/3} 2x \sin 2x \, dx$

(i) $\frac{\pi}{2} - \frac{1}{4}$ (ii) $\frac{3\pi}{4} - \frac{1}{6}$ (iii) $\frac{\pi}{3} + \frac{\sqrt{3}}{2}$ (iv) $\frac{\pi}{6} + \frac{\sqrt{3}}{4}$ (v) $\frac{\pi}{3} + \frac{\sqrt{2}}{2}$

(b) $\int_1^{\infty} \frac{\ln y}{y^2} \, dy$

(i) 0 (ii) $\frac{1}{2}$ (iii) 1 (iv) $\frac{3}{2}$ (i) ∞

2. Evaluate the following definite integrals:

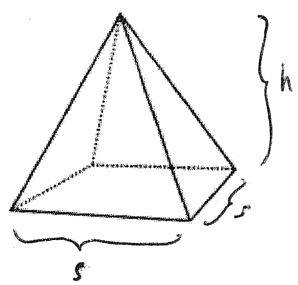
(a) $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}}\, dx$

(i) $2e^2 - 2e$ (ii) $(e^2 - e)/2$ (iii) $2e^4 - 2e$ (iv) $(e^4 - e)/2$ (v) ∞

(b) $\int_{-\pi/2}^{\pi/2} \frac{\cos y}{\sin^2 y}\, dy$

(i) 0 (ii) 2 (iii) -2 (iv) ∞ (v) $-\infty$

3. Find the volume of a pyramid whose height is h and whose base is a square with side length s.



(i) $\frac{sh}{4}$ (ii) $\frac{s^2h}{3}$ (iii) $\frac{s}{4h^2}$ (iv) $\frac{sh^2}{2}$ (v) $\frac{s^2}{2h}$

4. Find the general indefinite integrals.

(a) $\int \sqrt{6x - x^2}\, dx$

(b) $\int \frac{y^2-2}{y^2-1}\, dy$

5. Find $\int \frac{1}{z^3-4z^2+5z}\,dz$.

6. Determine whether each of the following series is absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{n=2}^{\infty} \frac{1}{n^2 \ln n}$

(i) absolutely convergent (ii) conditionally convergent (iii) divergent

(b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{e^{1/n}}$

(i) absolutely convergent (ii) conditionally convergent (iii) divergent

(c) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n+e^{1/n}}$

(i) absolutely convergent (ii) conditionally convergent (iii) divergent

7. Determine the interval of convergence of each power series.

(a) $\sum_{n=2}^{\infty} \frac{1}{\ln n}(x-3)^n$

(i) $[2,4]$ (ii) $[2,4)$ (iii) $(1,5)$ (iv) $(1,5]$ (v) $(-\infty,\infty)$

(b) $\sum_{n=0}^{\infty} \frac{1}{n!}(x-2)^n$

(i) $[1,3]$ (ii) $[1,3)$ (iii) $(0,4)$ (iv) $(0,4]$ (v) $(-\infty,\infty)$

8. Use Taylor's formula to find the first five nonzero terms of the Taylor series for the function $f(x) = \sqrt{x}$ expanded about the point $x = 1$.

9. Express as infinite series.

(a) $\int \frac{e^x-1}{x}\,dx$ (include up to the x^3 term)

(b) $x\cos^2 x$ (include up to the x^5 term)

10. Solve the differential equations.

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

(b) $y' = \frac{2y}{x} + x^5$ (give the general solution)