NAME:_____

MATH 181 TEST 4 SAMPLE

NOTE: The actual exam will only have 11 questions. The different parts of each question (part A, B, etc.) are variations. Know how to do all the variations on this exam.

1A.) (6 pts) Find the antiderivative: $\int\left(\frac{9+4y^3}{\sqrt[3]{y^2}}\right)dy$ 1A._____

1B.) (6 pts) Find the antiderivative: $\int\left(\frac{1-5\sqrt{x}+6x^{-\frac{1}{2}}}{\sqrt{x}}\right)dx$ 1B._____

2A.) (6 pts) Use the **limit process** to find the area between the graph $y = 9 - x^2$ and the x-axis over [0, 3].

2A._____

2B.) (6 pts) Use the **limit process** to find the area between the graph $y = \frac{1}{2}x - 1$ and the x-axis over [1, 2].

2B._____

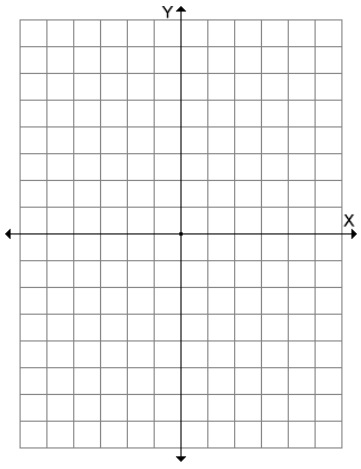
3A.) (6 pts) Find the antiderivative: 3A._____

$$\int \left(-4\csc^2(2\theta)+14\cos(7\theta)-2e^{5\theta}\right)d\theta$$

3B.) (6 pts) Find the antiderivative: 3B._____

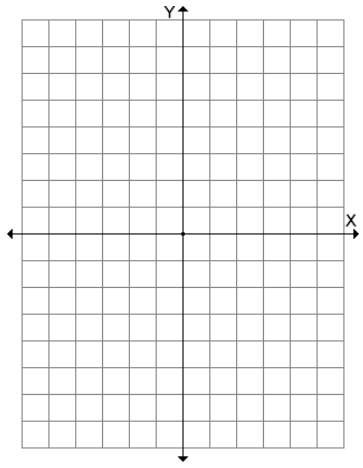
$$\int \left(3\sec\left(\frac{\theta}{2}\right)\tan\left(\frac{\theta}{2}\right)-8\sin(\pi\theta)+2^{7\theta}\right)d\theta$$

4A.) (4 pts) Sketch the region whose area is $\int_0^4 \left(|x-2|+3\right)\,dx$. Then use **geometric formulas** to evaluate the integral. 4A._____



4B.) (4 pts) Sketch the region whose area is $\int_{-4}^{4}\left(4-\sqrt{16-x^2}\right)dx$. 4B._____

Then use **geometric formulas** to evaluate the integral.



5A.) (4 pts) Suppose *f* and *g* are integrable and that: $\int_{0}^{3} f(x)dx = 4$, 5A._____

$\int_{0}^{3} g(x)dx = 9$. Use integral rules to find the following:

$\int_{3}^{0}[2f(x)-3g(x)]dx+\int_{3}^{3} f(x)\ dx$

5B.) (4 pts) Suppose *f* and *g* are integrable and that: $\int_{-1}^{1} f(x)dx = \frac{1}{2}$, 5B._____

$\int_{0}^{1} f(x)dx = -3$. Use integral rules to find $\int_{0}^{-1} 2f(x)dx$.

6A.) (4 pts) Find the **total area** between $y = 2x^3 - 2x^2 - 4x$ and the x-axis on [–1, 2].

6A._____

6B.) (4 pts) Find the **total area** between $y = x^3 - 9x$ and the x-axis on [–3, 3].

6B._____

7A. (6 pts) Find the indefinite integral: $\int \frac{y\sin(2y^2)}{1+\cos(2y^2)}\,dy$

7A._____

7B.) (6 pts) Find the indefinite integral: $\int \frac{(x-2)(x+5)}{2x^3+9x^2-60x}\,dx$ 7B._____

8A.) (6 pts) Find the indefinite integral: $\int (x+1)\sqrt{2-x}\,dx$ 8A._____

8B.) (6 pts) Find the indefinite integral: $\int x^5\left(x^3-5\right)^4\,dx$ 8B._____

9A.) (6 pts) Find the indefinite integral: $\int \frac{3dx}{\sqrt{9-(2x-1)^2}}$ 9A._____

9B.) (6 pts) Find the indefinite integral: $\int \frac{dx}{x \ln x \sqrt{(\ln x)^2 - 4}}$ 9B._____

10A.) (6 pts) Find the indefinite integral: $\int \sin(2x) \cdot \cot\big(\cos(2x)\big)\, dx$ 10A._____

10B.) (6 pts) Evaluate the definite integral $\int \frac{3}{\sqrt{2x-7}} \cdot \sec\left(\sqrt{2x-7}\right) dx$ 10B._____

11A.) (6 pts) Evaluate the definite integral $\int_0^3 \left(3x^2 - 10x + 3\right)^3 \left(24x - 40\right) dx$ 11A._____

11B.) (6 pts) Evaluate the definite integral $\int_0^{\frac{\pi}{2}} \left(\sin x\right) e^{\cos x} \, dx$ 11B._____

11C.) (6 pts) Evaluate the definite integral $\int_1^e \frac{\ln\left(\sqrt{x}\right)}{x}\,dx$ 11C._____

MATH 181 TEST 4 REVIEW PROBS

Section	Problems
4.8	#25 – 62
5.1	NONE (Just do homework in MML)
5.2	#39 – 46 (find the area under the curve using the limit process)
5.3	#9 – 14, 15 – 22
5.4	#1 – 32, 57 – 60
5.5	#17 – 60
5.6	#13 – 46

Test will be closed-book, and no notes are allowed (no notecards are allowed either). The exam will consist of problems similar to the ones on the sample test and the above list of review problems. The formula sheet attached to this sample test is the same one that will be provided on the actual test.

Selected Antiderivative formulas:

$$\int \frac{1}{x}\,dx = \ln|x| + C, \quad x \neq 0, \qquad \int e^{kx}dx = \frac{1}{k}e^{kx} + C$$

$$\int a^{kx}dx = \left(\frac{1}{k\ln a}\right)a^{kx} + C, \quad a > 0, \ a \neq 1$$

Integrals of Trigonometric Functions

$$\int \sin kx\,dx = -\frac{1}{k}\cos kx + C \qquad \int \cos kx\,du = \frac{1}{k}\sin kx + C \qquad \int \sec^2 kx\,dx = \frac{1}{k}\tan kx + C,$$

$$\int \sec kx \cdot \tan kx\,dx = \frac{1}{k}\sec kx + C \qquad \int \csc^2 kx\,dx = -\frac{1}{k}\cot kx + C \qquad \int \csc kx \cdot \cot kx\,dx = -\frac{1}{k}\csc kx + C$$

$$\int \tan u\,du = -\ln|\cos u| + C \qquad \int \cot u\,du = \ln|\sin u| + C$$

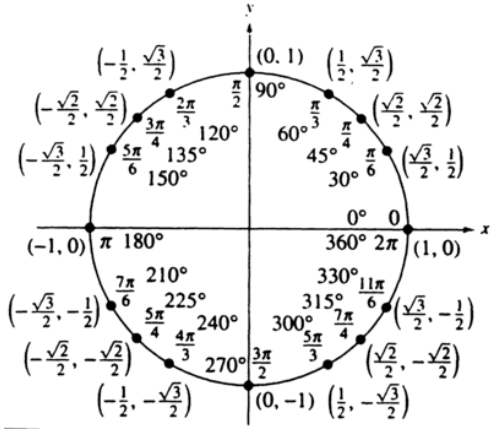
$$\int \sec u\,du = \ln|\sec u + \tan u| + C \qquad \int \csc u\,du = -\ln|\csc u + \cot u| + C$$

Integrals Involving Inverse Trigonometric Functions with Substitutions

$$\int \frac{du}{\sqrt{a^2 - u^2}} = \sin^{-1}\frac{u}{a} + C$$

$$\int \frac{du}{a^2 + u^2} = \frac{1}{a}\tan^{-1}\frac{u}{a} + C$$

$$\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a}\sec^{-1}\frac{|u|}{a} + C$$



Algebra Rules for Finite Sums

1.) $\sum_{i=1}^{n} k \cdot a_i = k\sum_{i=1}^{n} a_i$

2.) $\sum_{i=1}^{n} (a_i \pm b_i) = \sum_{i=1}^{n} a_i \pm \sum_{i=1}^{n} b_i$

$\lim_{n\to\infty} \sum_{i=1}^{n} f(c_i) \cdot \Delta x$

$\Delta x = \frac{b-a}{n}, \quad c_i = a + \Delta x i$

Summation Formulas

1.) $\sum_{i=1}^{n} c = c \cdot n$

2.) $\sum_{i=1}^{n} i = \frac{n(n+1)}{2} = \frac{n^2 + n}{2}$

3.) $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6} = \frac{2n^3 + 3n^2 + n}{6}$

4.) $\sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4} = \frac{n^4 + 2n^3 + n^2}{4}$

Geometry Formulas:

Triangle: $A = \frac{1}{2}bh$

Semicircle: $A = \frac{1}{2}\pi r^2$

Rectangle: A = LW