

NAME _____

Rec. Instructor: _____

Signature _____

Rec. Time _____

CALCULUS II - EXAM 1

February 5, 2019

Show all work for full credit. No books, notes or calculators are permitted. The point value of each problem is given in the left-hand margin. You have 75 minutes.

Problem	Points	Possible	Problem	Points	Possible
1a		10	4a		10
1b		10	4b		10
2a		10	5		10
2b		10	6		10
3a		10			
3b		10	Total Score		100

You are free to use the following formulas on any of the problems.

$$\sin(ax) \sin(bx) = \frac{1}{2} \cos((a-b)x) - \frac{1}{2} \cos((a+b)x), \quad \cos(ax) \cos(bx) = \frac{1}{2} \cos((a-b)x) + \frac{1}{2} \cos((a+b)x),$$

$$\sin^2(x) = \frac{1}{2} (1 - \cos(2x)), \quad \cos^2(x) = \frac{1}{2} (1 + \cos(2x)),$$

$$\int \tan x \, dx = -\ln |\cos x| + C, \quad \int \sec x \, dx = \ln |\sec x + \tan x| + C$$

$$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1} \left(\frac{x}{a} \right) + C, \quad \int \frac{dx}{a^2 + x^2} = \frac{1}{a} \tan^{-1} \left(\frac{x}{a} \right) + C, \quad \int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a} \sec^{-1} \left(\frac{x}{a} \right) + C$$

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

$$\int \tan^n x \, dx = \frac{\tan^{n-1} x}{n-1} - \int \tan^{n-2} x \, dx, \quad \int \sec^n x \, dx = \frac{\sec^{n-2} x \tan x}{n-1} + \frac{n-2}{n-1} \int \sec^{n-2} x \, dx$$

1. Evaluate the following integrals.

(10) a) $\int \frac{e^x}{(1 + e^x)^3} dx$

(10) b) $\int x\sqrt{x-1} dx$

2. Evaluate the following integrals.

(10) a) $\int x^2 \ln(x) \, dx$

(10) b) $\int \tan^{-1} x \, dx$, where $\tan^{-1} x = \arctan x$.

3. Evaluate the following integrals.

(10) a) $\int_0^1 \frac{dx}{\sqrt{4-x^2}}$

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

4. Evaluate the following integrals.

(10) a) $\int \sin^3(x) \cos^8(x) \, dx$

(10) b) $\int \tan^4(x) \, dx$

- (10) **5.** An object moves along a straight line with velocity function $v(t) = te^{-t}$, in meters per second. Determine its change in position over the time interval $t = 0$ to $t = 4$ seconds.

- (10) **6.** Find a function $f(s)$ such that $f'(s) = s \tan(s^2) - \sec^2(s)$.