MATH 121 **November 24, 2020**
Practice Exam 4

Name: _____

	Score
1	/0
2	/0
3	/0
4	/0
5	/0
6	/0
7	/0
Total	/0

Problem 1 (0 points)

Evaluate the following integrals

$$\int \frac{1+z^2}{z^6}\,dz$$

$$\int \frac{1}{x}+3e^x\,dx$$

$$\int_1^2 \frac{4}{x^2}\,dx$$

$$\int_0^\pi \cos y+\sin y\,dy$$

$$\int_{-a}^a x^5\,dx$$

Problem 2 (0 points)

Find the value of

$$\int_2^5 f(x)\,dx$$

using the following information:

$$\int_5^0 3f(x)\,dx = 9.$$

$$\int_0^2 f(x)\,dx = 5$$

Problem 3 (0 points)

Explain in words what the integral represents, give units.

$$\int_0^2 f(x)\,dx$$

where $f(x)$ is the rate at which you drink coffee the morning before an exam, measured in gallons per minute and x is measured in minutes, with $x = 0$ corresponding to 6am when you wake up.

$$\frac{1}{b-a}\int_a^b f(x)\,dx$$

where $f(x)$ is the amount of money, measured in dollars, in your bank account on day x.

Problem 4 (0 points) Find the **general antiderivative** of the following functions:

(a) $f(x) = x^2$
(b) $g(x) = 2\sin x$
(c) $h(x) = e^x + 2x + 1$

Problem 5 (0 points)

Given $f(x) = x^3 + 3x^2 - 9x + 6$, do the following:

(a) Find all local maxima and minima.

(b) Find all inflection points

(c) Now consider the domain $0 \leq x \leq 2$. Find the global maximum and minimum.

(d) For the domain $0 \leq x \leq 2$, what are the best possible bounds?

(e) Estimate the area under the curve using the average of the LEFT and RIGHT hand sums, with $0 \leq x \leq 4$ and $n = 4$. (SHOW YOUR WORK)

(f) Find the exact value of $\int_0^4 f(x)\,dx$ using the antiderivative and the fundamental theorem of calculus. (SHOW YOUR WORK)

Problem 6 (0 points)

Find the area under the line $y = -2x + 4$ and above the x axis for the domain $0 \leq x \leq 2$ by setting up and evaluating a definite integral. Then use basic geometry to verify that your answer is correct, by thinking of the area in terms of rectangles and/or triangles. (Draw a picture)

Problem 7 (0 points)

A rocket traveling at $87m/s$ is accelerated to $132m/s$ over a time of 15 seconds. What is it's displacement during this time? Use a differential equation to solve this problem.

A pilot stops a plane in 484 meters using an acceleration of $-8m/s^2$. How fast was the plane moving before braking began? How long did it take the plane to come to a complete stop? Use a differential equation to solve this problem.