CLARK UNIVERSITY

Name: _____

Circle your instructor's name:

Hill Joyce Winders

Math 121 Calculus II

First Test

February 2016

This is a closed-book, closed-notes test. Calculators are not allowed. Please turn off your cellphone and any other electronic equipment during the test.

Leave your answers as expressions such as $e^2\sqrt{\dfrac{\sin^2(\pi/6)}{1+\ln 10}}$ if you like. Show all your work for credit. Be sure that your proofs and computations are easy to read. Points for each problem are in square brackets.

1. [10] **On integrals and derivatives.** Suppose a function $f(x)$ defined on the interval $[3, 7]$ has a maximum value of 5 and a minimum value of 2. Explain why the value of the integral $\displaystyle\int_3^7 f(x)\,dx$ cannot equal 6. (Write clearly and use full sentences. Suggestion: draw a figure.)

2. [20; 10 points each part] **Evaluate the indefinite integrals.**

a. $\displaystyle\int \left(9x^5 - \sqrt{x} + \frac{7}{x}\right) dx$

b. $\displaystyle\int \sec^2(8x)\, dx$

3. [20; 10 points each part] **On definite integrals.** Evaluate the following integrals. Show your work for credit. (You do not have to find the answer decimally; an unsimplified expression involving numbers is sufficient.)

a. $\displaystyle\int_0^{\pi/2} (5\cos x - 2\sin x)\,dx$

b. $\displaystyle\int_1^2 x^2 e^{x^3-1}\,dx$

4. [10; 5 points each part] **On areas between curves.** Consider the region in the plane between the straight line $y = \sqrt{5} - x$ and the hyperbola $y = 1/x$.

a. The line and the hyperbola intersect at two points. What are their x-coordinates?

b. Write down an integral which gives the area of that region. Do not compute the value of that integral.

5. [20; 10 points each part] **On volumes of solids of revolution.** In each case write down an expression for the volume of this solid in terms of integrals. Don't valuate the integrals.

a. Consider the region below the curve $y = 8 \sin 2x$ and above the x-axis for x between 0 and $\pi/2$. Rotate this region around the x-axis to get a solid of revolution. Write down an integral which gives the volume of that solid of revolution. Do not compute the value of the integral.

b. The solid of revolution is formed by rotating around the x-axis the region between the straight line $y = \sqrt{5} - x$ and the hyperbola $y = 1/x$. (See the previous problem.) Write down an integral which gives the volume of that solid of revolution. Do not compute the value of the integral.

6. [10] **On arc lengths.** Write down an integral which gives the length of that part of the parabola $x = y^2$ with endpoints $(4, -2)$ and $(4, 2)$. Do NOT evaluate the integral.

7. [10] Evaluate the derivative $\dfrac{d}{dx}\displaystyle\int_3^x \frac{1}{1+t^5}\,dt$. (Hint: do not try to evaluate the integral.)

#1.[10]	
#2.[20]	
#3.[20]	
#4.[10]	
#5.[20]	
#6.[10]	
#7.[10]	
Total	