Calculus 1, Handwritten Homework 13 — Spring 2022

NAME _____ STUDENT NUMBER _____

Write in complete sentences and use correct notation (such as equal signs and integral signs). Give justifications for your claims using the definitions and theorems in the notes and book (quote them by name or number, as is done in the examples in the notes and videos, and in the solutions posted online). Give precise values, not numerical (calculator) approximations. If provided, put your final answer in the box. Each numbered problem is worth 5 points. Print out this document, work the problem, scan your solutions, and submit the scan of (in PDF) to the D2L DropBox by the deadline. See the online syllabus for deadlines. **Do not copy work from others or from the internet! This will result in you being charged with academic misconduct.**

1(a). Suppose that $\int_{-3}^{0} g(t)\,dt = \sqrt{2}$. Find **(a)** $\displaystyle\int_{0}^{-3} g(t)\,dt$, **(b)** $\displaystyle\int_{-3}^{0} g(u)\,du$, **(c)** $\displaystyle\int_{-3}^{0} [-g(x)]\,dx$, **(d)** $\displaystyle\int_{-3}^{0} \frac{g(r)}{\sqrt{2}}\,dr$., This is Exercise 12 of Section 5.3.

1(b). Use Equations (2) and (4) of Section 5.3 (which appear in the notes as Example 5.3.A and Exercise 5.3.65, respectively) to evaluate the integral $\int_0^{3b} x^2\,dx$. This is Exercise 40 in Section 5.3.

2(a). Use Equations (3) and (4) of Section 5.3 (which appear in the notes as Exercise 5.3.63 and Exercise 5.3.65, respectively) to find the average value of $f(x) = 3x^2 - 3$ on the interval $[0, 1]$. This is Exercise 58 in Section 5.3.

2(b). Use the Fundamental Theorem of Calculus Part 2 to evaluate $\displaystyle\int_1^8 \frac{(x^{1/3}+1)(2-x^{2/3})}{x^{1/3}}\,dx$.
This is Exercise 24 of Section 5.4

3(a). Apply The Fundamental Theorem of Calculus, Part 1 to evaluate dy/dx for $y = \displaystyle\int_{\tan x}^0 \frac{dt}{1+t^2}\,dt$.
This is Exercise 52 of Section 5.4

3(b). Find the area of the shaded region (this is Exercise 63 of Section 5.4):