

Last name: _____

First name: _____

Section: _____

Question:	1	2	Total
Points:	10	10	20
Score:			

Instructions: You must answer all the questions below and give your solutions to the TA at the end of the recitation. Write your solutions on a different sheet of paper. No late worksheet will be accepted.

QUESTION 1 (10 pts)

Suppose that $\int_0^1 f(x) dx = 4$, $\int_{-1}^0 f(x) dx = -4$, and $\int_0^1 g(x) dx = -3$. Using the properties of the integral, compute the following definite integrals.

(a) (5 points) $\int_0^1 (f(x) + 5g(x)) dx$

Solution: From the properties of the integral:

$$\int_0^1 f(x) + 5f(x) dx = \int_0^1 f(x) + 5 \int_0^1 g(x) dx = 4 - 15 = -11.$$

(b) (5 points) $\int_{-1}^1 f(x) dx$.

Solution: From the properties of the integral:

$$\int_{-1}^1 f(x) dx = \int_{-1}^0 f(x) dx + \int_0^1 f(x) dx = 4 + (-4) = 0.$$

QUESTION 2

(10 pts)

Find the derivative of the following functions. Justify your answers with the proper theorem.

(a) (5 points) $F(x) = \int_0^x \left(\frac{x}{x+1} \right)^{2021} dx.$

Solution: By the Fundamental Theorem of Calculus, we have $F'(x) = \left(\frac{x}{x+1} \right)^{2021}.$

(b) (5 points) $W(x) = \int_0^x [x \sin x + x^2 \tan^2(x^2 + 1)] dx.$

Solution: By the Fundamental Theorem of Calculus, we have $F'(x) = x \sin x + x^2 \tan^2(x^2 + 1).$