

ASSIGNMENT 43

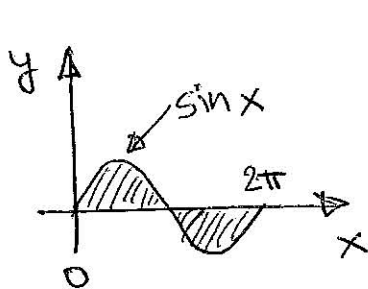
1. I... $\int_a^b (f(x) + g(x)) dx = \int_a^b f(x) dx + \int_a^b g(x) dx = 11$ ✓
 (F) II... integral of product \neq product of integrals
 III... $\int_a^b (2f(x) - g(x)) dx = \int_a^b 2f(x) dx - \int_a^b g(x) dx$
 $= 2 \underbrace{\int_a^b f(x) dx}_4 - \underbrace{\int_a^b g(x) dx}_7 = 1$ ✓

2. FALSE; counterexample:

$$\int \underbrace{2t}_{q(t)} dt = \underbrace{t^2}_{p(t)} \quad \text{but } q'(t) = (2t)' = 2 \neq p(t)$$

3. FALSE; $(\frac{1}{x} + C)' = -\frac{1}{x^2} \neq \ln x$

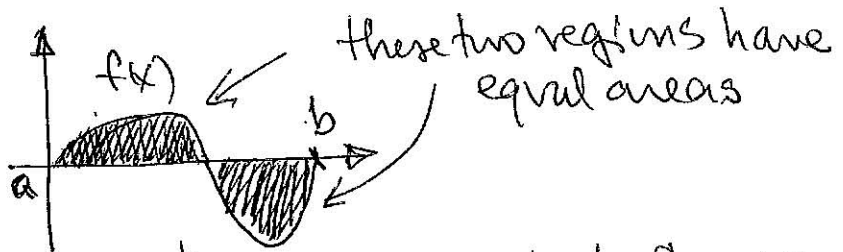
4. FALSE;



$$\int_0^{2\pi} \sin x dx = 0$$

but $\sin x \neq 0$

or:



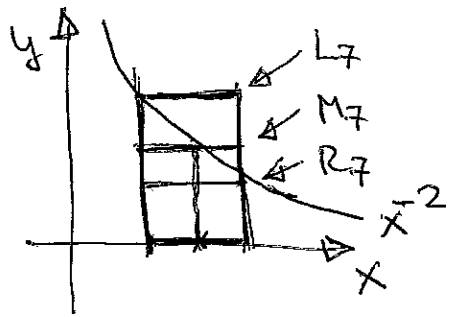
then $\int_a^b f(x) dx = 0$ but $f(x) \neq 0$

5. $\int_1^2 f'(x) dx \stackrel{FTC}{=} f(x) \Big|_1^2 = f(2) - f(1) = 1$
 TRUE

6. TRUE; since the definite integral is a real number

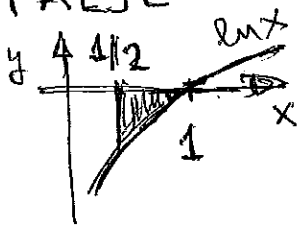
7. FALSE; incorrect use of FTC; should be
 $\int_{-1}^1 x^4 dx = \left(\frac{x^5}{5} \right) \Big|_{-1}^1 = \dots$
 → antiderivative!

8. TRUE, by the def. of antiderivative

9.  TRUE
 (for any decreasing function)

10. FALSE integral of product \neq product of integrals

OR! differentiate $\frac{x^3}{3} \cdot \frac{e^{2x}}{2} = \frac{1}{6} x^3 e^{2x}$
 and show that $\neq x^2 e^{2x}$

11. FALSE  $\ln x \leq 0$ on $[1/2, 1]$
 so $\int_{1/2}^1 \ln x < 0$