Math 1120 Section 4 Quiz 1 Hint

Please write down your name and ID number. Show your reasoning and all your work. This is a 10 minute Quiz. Good luck!

Problem 1. (10 pts) Calculate $\int_0^{\pi} |\cos x| dx$. Since $\cos x \ge 0$ for $0 \le x \le \pi/2$ and $\cos x \le 0$ for $\pi/2 \le x \le \pi$

$$\int_0^{\pi} |\cos x| dx = \int_0^{\pi/2} \cos x dx + \int_{\pi/2}^{\pi} -\cos x dx$$
$$= \sin x \mid_0^{\pi/2} - \sin x \mid_{\pi/2}^{\pi} = 2$$

 ${\bf Problem \ 2} \ ({\rm 5pts \ each})$

a. Find a function f(x) such that $\int_0^{2x} f(t)dt = 2x^2$. By the first fundamental theorem of calculus, differentiating both sides yields

$$(2x)'f(2x) = 4x$$
$$f(2x) = 2x$$
$$f(x) = x$$

To check, $\int_0^{2x} t dt = \frac{t^2}{2} |_0^{2x} = 2x^2$. Thus, f(x) = x is the required function.

b. Is there a function f(x) such that $\int_0^{2x} f(t)dt = 2x^2 + 1$? No since if x = 0, the LHS = 0 while RHS = 1.