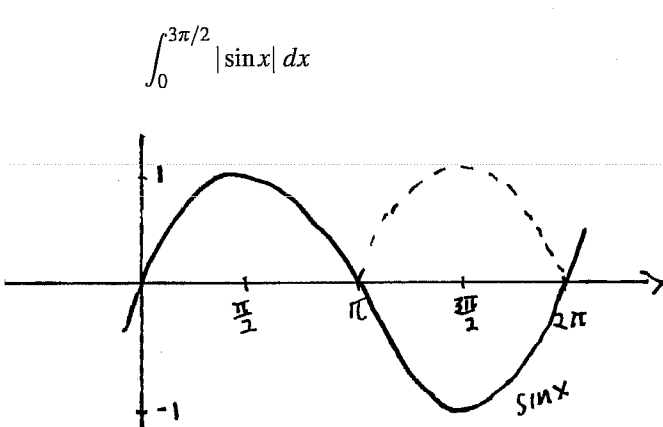


## Quiz 4

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. (5 marks) §5.3 #30 Evaluate the integral.



$$\begin{aligned} \int_0^{3\pi/2} |\sin x| dx &= \int_0^{\pi} |\sin x| dx + \int_{\pi}^{3\pi/2} |\sin x| dx \\ &= \int_0^{\pi} \sin x dx + \int_{\pi}^{3\pi/2} -\sin x dx \\ &= [-\cos x]_0^{\pi} + [\cos x]_{\pi}^{3\pi/2} \\ &= -\cos \pi - (-\cos 0) + \cos \frac{3\pi}{2} - \cos \pi \\ &= -(-1) + 1 + 0 - (-1) \\ &= 3 \end{aligned}$$

Question 2. (5 marks) §5.4 #14 Use the Fundamental Theorem of Calculus to find the derivative of the function.

$$y = \int_{\sin x}^{\cos x} (1+v^2)^{10} dv$$

$$\begin{aligned} y &= \int_{\sin x}^0 (1+v^2)^{10} dv + \int_0^{\cos x} (1+v^2)^{10} dv \\ &= - \int_0^{\sin x} (1+v^2)^{10} dv + \int_0^{\cos x} (1+v^2)^{10} dv \\ &= -f(g_1(x)) + f(g_2(x)) \end{aligned}$$

$$\text{where } f(x) = \int_0^x (1+v^2)^{10} dv$$

$$f'(x) = (1+x^2)^{10} \text{ by } 2^{\text{nd}} \text{ FTC}$$

$$\begin{aligned} g_1(x) &= \sin x & g_1'(x) &= \cos x \\ g_2(x) &= \cos x & g_2'(x) &= -\sin x \end{aligned}$$

$$\begin{aligned} y' &= -f'(g_1(x))g_1'(x) + f'(g_2(x))g_2'(x) \\ &= -(1+\sin^2 x)^{10} \cos x - (1+\cos^2 x)^{10} \sin x \end{aligned}$$