7 October 2014 The Fundamental Theorem of Calculus Part 2

(1) Evaluate the following definite integrals ι^1

(a)
$$\int_0^1 (x^2 - 3x + 2)\sqrt{x} \, dx$$

(b)
$$\int_0^{\pi/2} \sin 2x \, dx$$

(c)
$$\int_0^2 (y-1)(2y+1) \, dy$$

(2) (a) Suppose f(x) is an odd function. What is the value of

$$\int_{-a}^{a} f(x) \, dx?$$

(b) Suppose g(x) is an even function and that $\int_0^a g(x) = M$. What is the value of $\int_{-a}^a g(x) \, dx$?

(3) The following definite integrals require *u*-substitution. Evaluate them by changing the *x*-limits of integration to *u*-limits of integration. $t^{1/2}$

(a)
$$\int_{1/6}^{1/2} \csc \pi t \, \cot \pi t \, dt$$

(b)
$$\int_0^{1/2} \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$$

(c)
$$\int_0^a x\sqrt{a^2 - x^2} \, dx$$

(4) Evaluate $\int_0^1 x \sqrt{1-x^4} \, dx$ by making a substitution, but without using the Fundamental Theorem of Calculus.

(5) If
$$f(x)$$
 is continuous and $\int_0^9 f(x) dx = 4$, find $\int_0^3 x f(x^2) dx$.