## 7 October 2014 The Fundamental Theorem of Calculus Part 2

(1) Evaluate the following definite integrals
(a) $\int_{0}^{1}\left(x^{2}-3 x+2\right) \sqrt{x} d x$
(b) $\int_{0}^{\pi / 2} \sin 2 x d x$
(c) $\int_{0}^{2}(y-1)(2 y+1) d y$
(2) (a) Suppose $f(x)$ is an odd function. What is the value of

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

(b) Suppose $g(x)$ is an even function and that $\int_{0}^{a} g(x)=M$. What is the value of

$$
\int_{-a}^{a} g(x) d x ?
$$

(3) The following definite integrals require $u$-substitution. Evaluate them by changing the $x$-limits of integration to $u$-limits of integration.
(a) $\int_{1 / 6}^{1 / 2} \csc \pi t \cot \pi t d t$
(b) $\int_{0}^{1 / 2} \frac{\sin ^{-1} x}{\sqrt{1-x^{2}}} d x$
(c) $\int_{0}^{a} x \sqrt{a^{2}-x^{2}} d x$
(4) Evaluate $\int_{0}^{1} x \sqrt{1-x^{4}} d x$ by making a substitution, but without using the Fundamental Theorem of Calculus.
(5) If $f(x)$ is continuous and $\int_{0}^{9} f(x) d x=4$, find $\int_{0}^{3} x f\left(x^{2}\right) d x$.

