31 October 2014 **u-Substitution**

(1) Evaluate the following antiderivatives by making the given substitution.

(a) $\displaystyle\int x^2\sqrt{x^3+1}\,dx, \qquad u = x^3+1$

(b) $\displaystyle\int \cos^3\theta \sin\theta\,d\theta, \qquad u = \cos\theta$

(c) $\displaystyle\int \frac{\sec^2(1/x)}{x^2}\,dx, \qquad u = 1/x$

(d) $\displaystyle\int \frac{\sin(\ln x)}{x}\,dx, \qquad u = \ln x$

(e) $\displaystyle\int \frac{dx}{x + x(\ln x)^2}, \qquad u = \ln x$

(f) $\displaystyle\int x\sqrt{x-1}\,dx, \qquad u = x - 1 \qquad \text{Hint: } x = u + 1$

(2) Evaluate the following antiderivatives.

(a) $\displaystyle\int \frac{dx}{5-3x}$

(b) $\displaystyle\int \frac{\arctan x}{1+x^2}\,dx$

(c) $\displaystyle\int \left(x+\frac{1}{x}\right)^{3/2}\left(\frac{x^2-1}{x^2}\right)\,dx$

(d) $\displaystyle\int \frac{e^z + 1}{e^z + z}\, dz$

(e) $\displaystyle\int \frac{x^3}{\sqrt{1 - 2x^2}}\, dx$ Hint: look at 1(f)

(f) $\displaystyle\int \frac{x + 3}{(3 - x)^{3/2}}\, dx$ Hint: look at 1(f) and 2(e)