Worksheet – Integration by Substitution

1. Evaluate each of the following:

a) $\int x^6\ dx$

b) $\int \frac{dx}{x^6}$

c) $\int \sqrt[3]{z}\ dz$

d) $\int \frac{dx}{\sqrt[3]{x^2}}$

e) $\int (1-x)\sqrt{x}\ dx$

f) $\int\ (3s+4)^2\ ds$

g) $\int \frac{x^3+5x^2-4}{x^2}\ dx$

h) $\int (p^3+2)^2(3p^2)\,dp$

i) $\int\ (x^3+2)^{0.5}x^2\ dx$

j) $\int \frac{8x^2}{(x^3+2)^3}dx$

k) $\int \frac{x^2\ dx}{\sqrt[4]{x^3+2}}$

l) $\int 3x\sqrt{1-2x^2}\ dx$

m) $\int \sqrt[3]{1-x^2}\ x\ dx$

o) $\int \sin^2 x\cos x\,dx$

p) $\int x^2\sqrt{x^3+1}\,dx$

q) $\int x\sec^2(4x^2-5)\,dx$

r) $\int x\sin(3x^2)\ dx$

s) $\int 2xe^{3x^2}\ dx$

t) $\int e^{2x}\sin(e^{2x})\ dx$

u) $\int_0^{\pi} x\sin x^2\ dx$

v) $\int \tan^3\theta\sec^2\theta\,d\theta$

2. Find an equation of the curve passing through the point (3,2) and having slope $5x^2-x+1$ at every point (x,y).

3. The value of a vintage sports trading card in "t" years since 1950, in dollars, is given by *V(t)*. Given $\frac{dV}{dt}=\frac{3}{\sqrt{6x+1}}$, without using a calculator, determine the value of the card in 2010 if it was worth $16 in 1988.

4. In a very controlled environment, Albert noted that the acceleration of a pendulum was given by the function $a(t)=18\sin 3t$. If the velocity at t = 0 is -6 *ft / sec*, find the velocity equation.