The differentiation rule that helps us understand why the Substitution rule works is:

a) The product rule.

b) The chain rule.

c) The quotient rule.

d) All of the above.

Find the indefinite integrals.

(i) $\displaystyle\int x^2\sqrt{x^3+21}\,dx$

(ii) $\displaystyle\int \cos^4(\theta)\sin(\theta)\,d\theta$

(iii) $\displaystyle\int (9t+7)^{2.5}\,dt$

(iv) $\displaystyle\int (x+5)\sqrt{10x+x^2}\,dx$

(v) $\displaystyle\int \frac{z^3}{\sqrt[3]{3+z^4}}\,dz$

(vi) $\displaystyle\int x(8x+7)^8\,dx$

Find the indefinite integrals and evaluate the definite integrals.

(i) $\int x^3 \sqrt{x^2+4}\, dx$

(ii) $\int x^5 \sin(x^6)\, dx$

(iii) $\int \sec^2(\theta) \tan^7(\theta)\, d\theta$

(iv) $\int \sqrt{x^5} \sin(2 + x^{7/2})\, dx$

(v) $\int \frac{\cos(\pi/x^{29})}{x^{30}}\, dx$

(vi) $\int \sin(45t) \sec^2(\cos(45t))\, dt$

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

Evaluate the definite integrals.

(i) $\int_0^1 \sqrt[3]{1+7x}\,dx$

(ii) $\int_0^{\sqrt[14]{\pi}} x^{13}\cos(x^{14})\,dx$

(iii) $\int_0^{\pi/10} \cos(5x)\sin(\sin(5x))\,dx$

(iv) $\int_0^{31} \frac{dx}{\sqrt[3]{(1+4x)^2}}$

(v) $\int_9^{10} x\sqrt{x-9}\,dx$