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O restart:with( plots):with( student);
Section I ex 1
O g(x)= arctan(exp(x)); Diff(g(x),x)= diff(g(x),x):simplify(%);

$$\frac{d}{dx} \arctan(e^x) = \frac{e^x}{1+e^{2x}} \quad (1)$$

ex 2
O g(x)= arcsin(1+ x^2); Diff(g(x),x)= diff(g(x),x);

$$\frac{d}{dx} \arcsin(1+x^2) = \frac{2x}{\sqrt{1-x^2(1+x^2)}} \quad (2)$$

ex 3
O g(x)= exp(x^3*x); Diff(g(x),x)= diff(g(x),x):simplify(%);

$$\frac{d}{dx} e^{x^4} = (3x^3 C_1) e^{x^4} \quad (3)$$

Section II ex 1
O g:= x -> (sin(x))^3+ (cos(x))^2;
Int(g(x),x)= int(g(x),x);

$$\int \sin^3(x) \cos(x) dx = K \frac{1}{2} \sin(x)^2 \cos(x) + K \frac{1}{3} \cos(x)^3 \quad (4)$$

ex 2
O g:= x -> sec(x);
Int(g(x),x)= int(g(x),x);

$$\int \sec(x) C \tan(x) \quad (5)$$

ex 3
O g:= x -> (sin(x))^2;
Int(g(x),x)= int(g(x),x);

$$\int \sin(x)^2 dx = K \frac{1}{2} \sin(x) \cos(x) C \frac{1}{2} x \quad (6)$$

ex 4
O g:= x -> (tan(x))^3;
Int(g(x),x)= int(g(x),x):simplify(%);

$$\int \tan(x)^3 dx = K \frac{1}{2} \frac{K_1 C \cos(x)^2 C \ln\left(\frac{1}{\cos(x)}\right) \cos(x)^2}{\cos(x)} \quad (7)$$

ex 5
O g:= x -> x*sin(x);
Int(g(x),x)= int(g(x),x) eval(%);

$$\int x \sin(x) dx = \sin(x) K x \cos(x) \quad (8)$$

ex 6

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O g:= x -> 1/(x^2+9);
Int(g(x),x)= Int(g(x),R);

$$\int \frac{1}{x^2+9} dx = \frac{1}{3} \operatorname{arctan}\left(\frac{1}{3}x\right)$$

ex7
O g:= x -> x/(x^2+9);
Int(g(x),x)= Int(g(x),R);

$$\int \frac{x}{x^2+9} dx = \frac{1}{2} \ln(x^2+9)$$

ex8
O g:= x -> 1/sqrt(9-x^2);
Int(g(x),x)= Int(g(x),R);

$$\int \frac{1}{\sqrt{9-x^2}} dx = \arcsin\left(\frac{1}{3}x\right)$$

ex9
O g:= x -> x/sqrt(9-x^2);
Int(g(x),x)= Int(g(x),R) simplify(y);

$$\int \frac{x}{\sqrt{9-x^2}} dx = R\sqrt{9-x^2}$$

ex10
O g:= x -> (ln(x)/x);
Int(g(x),x)= Int(g(x),R);

$$\int \frac{\ln(x)}{x} dx = \frac{1}{2} \ln(x)^2$$

ex11
O g:= x -> ln(x);
Int(g(x),x)= Int(g(x),R);

$$\int \ln(x) dx = x \ln(x) - K x$$

ex12
O g:= x -> x*exp(x);
Int(g(x),x)= Int(g(x),R);

$$\int x e^x dx = (R+C)x e^x$$

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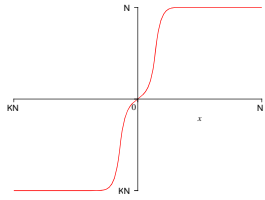
[Ex 13

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q1 := x -> x*exp(x^2);  
int(q1(x), x) = int(q1(x), x);  
| x e^{x^2} dx = \frac{1}{3} e^{x^3}
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Section IV end

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q(x) := x * exp(x^2); plot(q(x), x=-infinity .. infinity);
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q2 := diff(q(x), x); q2 := diff(q1(x), x);  
g1 := e^{x^2} * 2 * x e^2  
g2 := 6 * e^{x^2} * 4 * x^2 e^2
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