MA114 Worksheet for Section 9.2

Skills

1. Evaluate the following integrals.

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

   (b) $\displaystyle\int \frac{x}{x-5}\,dx$

   (c) $\displaystyle\int \frac{4x-1}{(x-1)(x-2)}\,dx$

   (d) $\displaystyle\int_0^2 \frac{x^3+x^2-12x+1}{x^2+x-12}\,dx$

   (e) $\displaystyle\int \frac{1}{x(x+1)(2x+3)}\,dx$

   (f) $\displaystyle\int_{-1/2}^{1/2} \frac{4x^2+5x+7}{4x^2+4x+5}\,dx$

   (g) $\displaystyle\int \frac{1}{x^3-1}\,dx$

   (h) $\displaystyle\int \frac{8x}{(x^2+4)^3}\,dx$

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

   (j) $\displaystyle\int \frac{(2\sin\theta-3)\cos\theta}{\sin^2\theta-3\sin\theta+2}\,d\theta$

   (k) $\displaystyle\int \frac{e^t}{e^{2t}+e^t-2}\,dt$

   (l) $\displaystyle\int \frac{1}{e^{2t}+1}\,dt$

Concepts

1. Find the area of the region under the given curve from a to b.

   (a) $y=\dfrac{1}{x^2-6x+b}$; $a=5, b=10$.

   (b) $y=\dfrac{x+1}{x-1}$; $a=2, b=3$.

2. Find the volume of the solid generated by revolving the area under the graph of $y=\dfrac{1}{(x^2+1)^2}$ from $x=0$ to $x=1$ about the y-axis.

3. Sometimes it is possible to eliminate radicals from an integral by making an appropriate substitution. Evaluate the integrals below by making the indicated substitution.

   (a) $\displaystyle\int \frac{\sqrt{x+4}}{x}\,dx$; $u^2=x+4$.

   (b) $\displaystyle\int \frac{1}{\sqrt{x}-\sqrt[3]{x}}\,dx$; $x=u^6$.

4. Try these brutal integrals.

   (a) $\displaystyle\int \frac{\sqrt{x-2}}{x+2}\,dx$.

(b) $\displaystyle\int \frac{\sqrt{1+\ln x}}{x \ln x}\, dx.$

(c) $\displaystyle\int \frac{x}{1-x^2+\sqrt{1-x^2}}\, dx.$

Maple

1. Use Maple's *convert* command to find the partial fraction decomposition of $r(x) = \dfrac{-2x^4+46x^2+196x+36}{x^5+5x^4-x^3-49x^2-32x+156}$. Then use the *int* command to integrate $r(x)$ and use the partial fraction decomposition above to explain the result of the integration.