§ 7.2 QUESTION NUMBER 21

Solution

$$\int \frac{t+7}{\sqrt{5-t}}\, dt$$

$$\int (t+7)\,(5-t)^{-\frac{1}{2}}\, dt$$

Null

using integration by parts , $\int u\,v\,dt = uv - \int v\,u\,dt$, we find u' and v :

$u = t+7$ $\qquad$ $v = -2\,(5-t)^{\frac{1}{2}}$

$u' = 1\,dt$ $\qquad$ $v' = (5-t)^{-\frac{1}{2}}\,dt$

So

$$\int (t+7)\,(5-t)^{-\frac{1}{2}}\, dt =$$

$$(t+7)\left(-2\,(5-t)^{\frac{1}{2}}\right) - \int -2\,(5-t)^{\frac{1}{2}} \cdot 1\, dt$$

$$=$$

$$-2t\,(5-t)^{\frac{1}{2}} - 14\,(5-t)^{\frac{1}{2}} + \frac{4}{3}\,(5-t)^{\frac{3}{2}} + c$$

Major Faults

A couple of students failed to recognise that the question required the use of integration by parts. Also a few were confused as to which part of the integrand should be assigned to u and v'.

A common fault was the integration of $v' = (5-t)^{-\frac{1}{2}}\,dt$ **and** $\int -2\,(5-t)^{\frac{1}{2}}\,dt$ **, the problem was dividing the expression by the rational exponent** $\frac{1}{2}$ **and ending up with 2 instead of** $\frac{1}{2}$**.**

Students should be mindful of the application of operational signs ;
(-) × (-) = + (-) × (+) = - etc

§ 7.2 QUESTION NUMBER 35

Solution

$$\int_0^5 \ln(1+t)\,dt$$

let $x = 1 + t$ then $dx = dt$ and our question reduces to

$$\int_1^6 \ln x\,dx \text{ and}$$

using integration by parts we have :

$u = \ln x \qquad v = x$ and

$u' = \frac{1}{x}\,dx \qquad v' = dx$

$$x\ln x\Big|_1^6 - \int_1^6 \frac{1}{x}\,x\,dx$$

$$= x\ln x - x\Big|_1^6$$

then substituting for x we have

$$= (1+t)\ln(1+t) - \ln(1+t)\Big|_0^5$$

$$= 6\ln 6 - 5$$

$$\approx 5.751$$

Major Faults

Most student for got this question
was one that had limits and so would yield a numeric answer.

Also some students used calculators to obtain the
solution without showing how they actually arrived at the answer. The
only reason a calculator was allowed was to evaluate 6 ln6 - 5.

There was a general difficulty in substituting for
(1 + t) and then using integration by parts on this particular quiz.