**Self-assessment answers: 15 Further integration**

**1.** *V* = 

= 

= 

= *[5 marks]*

**2.** *u* = *x* – 1 ⇒ d*u* = d*x*



= 



  *[6 marks]*

**3.** Let *u* = *x*2 – *x* + 5

⇒  = 2*x* − 1

When *x* = 3, *u* = 11, and when *x* = 1, *u* = 5.



=  = 

=  *[6 marks]*

**4.** (a) *a* =  = 3e −2*t* cos *t* – 6e −2*t* sin *t* = 3e −2*t*(cos *t* – 2 sin *t*)

When at maximum velocity, *a* = 0 ⇒ tan *t* = 0.5 (on the first occasion, since the exponential means that it will never again reach that level).

⇒ *t* = 0.464 s

(b) *a*(3) = −0.00946 ms −2

(c) *v* is positive for 0 ≤ *t* ≤ π, so distance travelled equals displacement at *t* = 3.

distance == 0.601 m (GDC)

(d) Displacement *x*(*t*) = 

 (integration by parts)

 (integration by parts)



⇒ 

*[13 marks]*