12	11d	Use the substitution $u = 2 - x$ to evaluate $\int_1^2 x(2-x)^5 \, dx$.	3

State Mean: **2.45/3**

$u = 2 - x$ If $x = 2$, $u = 0$

$\frac{du}{dx} = -1$ If $x = 1$, $u = 1$

$dx = -du$

$$\int_1^2 x(2-x)^5 \, dx = \int_{u=1}^{u=0} (u-2)u^5 \, -dx.$$

$$= \int_0^1 \left(u^6 - 2u^5\right) du$$

$$= \frac{u^7}{7} - \frac{2u^6}{6}\Big]_0^1$$

$$= \frac{1}{7} - \frac{1}{3}$$

$$= \frac{4}{21}$$

Board of Studies: Notes from the Marking Centre

Most candidates correctly found the correct derivative of the given substitution and/or changed the limits. In better responses, candidates correctly rearranged the integrand using the substitutions. In weaker responses, candidates made errors when trying to establish the integrand following the substitution. Some candidates handled the negative arising from $\frac{du}{dx}$ incorrectly.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/