## Chapter 6 Problem $75^{\dagger}$

## Given

$$
F=\left\{\begin{array}{rl}
100 x^{2} & 0 \leq x<1 \\
100\left(4 x-x^{2}-2\right) & 1 \leq x \leq 2
\end{array}\right.
$$

## Solution

a) Find the work done between $x=0 m$ and $x=1.0 m$.

Using the definition of work we get

$$
\begin{aligned}
& W=\int F d x=\int_{0}^{1} 100 x^{2} d x \\
& W=\left.\frac{100 x^{3}}{3}\right|_{0} ^{1}=33.3 \mathrm{~J}
\end{aligned}
$$

b) Find the work done between $x=1.0 \mathrm{~m}$ and 2.0 m .

Using the definition of work we get

$$
\begin{aligned}
& W=\int F d x=\int_{1}^{2} 100\left(4 x-x^{2}-2\right) d x \\
& W=\left.100\left(\frac{4 x^{2}}{2}-\frac{x^{3}}{3}-2 x\right)\right|_{1} ^{2} \\
& W=100\left(\frac{4(2)^{2}}{2}-\frac{(2)^{3}}{3}-2(2)\right)-100\left(\frac{4(1)^{2}}{2}-\frac{(1)^{3}}{3}-2(1)\right) \\
& W=167 J
\end{aligned}
$$

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[^0]:    ${ }^{\dagger}$ Problem from Essential University Physics, Wolfson

