

1. Let $u = -2r + 7r^3$, then $u' = -2 + 21r^2$.

Let $v = 10r^3 + 5r$, then $v' = 30r^2 + 5$.

Product rule: $y' = u'v + uv'$.

Substitute u, u', v and v' into the product rule:

$$\begin{aligned} y' &= (-2 + 21r^2) \times (10r^3 + 5r) + (-2r + 7r^3) \times (30r^2 + 5) \\ &= -20r^3 - 10r + 210r^5 + 105r^3 - 60r^3 - 10r + 210r^5 + 35r^3 \end{aligned}$$

Hence $y' = 420r^5 + 60r^3 - 20r$.

2. Let $u = -2h^2 + 2$, then $u' = -4h$.

Let $v = -6 - 10h^3$, then $v' = -30h^2$.

Product rule: $y' = u'v + uv'$.

Substitute u, u', v and v' into the product rule:

$$\begin{aligned} y' &= -4h \times (-6 - 10h^3) + (-2h^2 + 2) \times (-30h^2) \\ &= 24h + 40h^4 + 60h^4 - 60h^2 \end{aligned}$$

Hence $y' = 100h^4 - 60h^2 + 24h$.

3. Let $u = -3r^3 - 1$, then $u' = -9r^2$.

Let $v = -1 - 4r^3$, then $v' = -12r^2$.

Product rule: $y' = u'v + uv'$.

Substitute u, u', v and v' into the product rule:

$$\begin{aligned} y' &= -9r^2 \times (-1 - 4r^3) + (-3r^3 - 1) \times (-12r^2) \\ &= 9r^2 + 36r^5 + 36r^5 + 12r^2 \end{aligned}$$

Hence $y' = 72r^5 + 21r^2$.