5.2

$$I = \int_{-3}^{3}\int_{0}^{5} (x^2 - 2y^3 + xy^4)\,dx\,dy$$

$$= \int_{-3}^{3} \frac{x^3}{3} - 2xy^3 + \frac{x^2}{2}y^4 \Big|_0^5 \,dy$$

$$= \int_{-3}^{3} \frac{125}{3} - 10y^3 + \frac{25}{2}y^4 \,dy$$

$$= \frac{125}{3}y - \frac{10}{4}y^4 + \frac{25}{2\cdot 5}y^5 \Big|_{-3}^{3}$$

$$= \frac{125}{3}(6) - \frac{5}{2}(3^4 - 3^4) + \frac{5}{2}(3^5)$$

$$= 125.2 + 5\cdot 3^5$$

$$\boxed{I = 1465}$$