

HW Feb 2, Johannes Byle

4.2

(a)

$$W = \int_0^1 x^2 dx + \int_0^1 2y dy = \frac{1}{3} + 1 = \frac{4}{3}$$

(b)

$$W = \int_0^1 x^2 + 2x^3 dx = \frac{x^3}{3} + \frac{4x^4}{4} \Big|_0^1 = \frac{1}{3} + 1 = \frac{4}{3}$$

(c)

$$W = \int_0^1 t^6 + 2t^5 dt = \frac{t^7}{7} + \frac{2t^6}{6} \Big|_0^1 = \frac{1}{7} + \frac{2}{3} = \frac{17}{21}$$

4.5

(a)

$$W = \int F \cdot dr = \int (F_x dx + F_y dy)$$

$$F_x = 0, F_y = mg$$

$$W = \int_h^0 mg dy = -mgh$$

(b)

$$W = \Delta E = U$$

Since y is the vertical axis, and since we are starting at zero h=y. Thus:

$$U = mgy$$