Answer on Question #50939 - Math - Integral Calculus

Integrate with respect to t:

$$\int_0^4 t\sqrt{t-2}dt$$

Solution

The domain of the integrand is given by

$$t \in [2, +\infty],$$

since the square root of negative number doesn't exist (at least in real analysis). Therefore the given integral doesn't exist, since the integrand is integrated over the region $[0, 2)$ where it's not defined.

Answer: doesn't exist.

2) Using Newton-Leibnitz formula and integral formula for powers,

$$\int_2^4 t\sqrt{t-2}dt = \int_2^4 (t-2)\sqrt{t-2}dt + 2\int_2^4 \sqrt{t-2}dt = |u := t-2, du = dt|$$

$$= \int_0^2 u\sqrt{u}du + 2\int_0^2 \sqrt{u}du = \left.\frac{u^{5/2}}{5/2}\right|_0^2 + 2\left.\frac{u^{3/2}}{3/2}\right|_0^2 = \frac{2}{5}\cdot 4\sqrt{2} + \frac{4}{3}\cdot 2\sqrt{2} = \frac{64\sqrt{2}}{15}$$

3)

$\int 0.4t\sqrt{t-2}dt = 0.4\int t\sqrt{t-2}dt = 0.4\int (t-2)\sqrt{t-2}dt + 0.4\cdot 2\int \sqrt{t-2}dt =$
$|u := t-2, du = dt| = 0.4\int u\sqrt{u}du + 0.8\int \sqrt{u}du = 0.4\frac{u^{5/2}}{5/2} + 0.8\frac{u^{3/2}}{3/2} + C$, where C is an arbitrary real constant.

4)

$\int 0.4(t-2)\sqrt{t}dt = 0.4\int t\sqrt{t}dt - 0.4\cdot 2\int \sqrt{t}dt = 0.4\int t\sqrt{t}dt - 0.8\int \sqrt{t}dt = 0.4\frac{t^{5/2}}{5/2} - 0.8\frac{u^{\frac{3}{2}}}{\frac{3}{2}} + C$, where C is an arbitrary real constant.

5)

$$\int_0^4 (t-2)\sqrt{t}dt = \int_0^4 t\sqrt{t}dt - 2\int_0^4 \sqrt{t}dt = \left.\frac{t^{5/2}}{5/2}\right|_0^4 - 2\left.\frac{t^{\frac{3}{2}}}{\frac{3}{2}}\right|_0^4 = \frac{2}{5}\cdot 32 - \frac{4}{3}\cdot 8 = \frac{32}{15}$$