The following data describes the motion of a particle:

$$a(t) = 3\cos(t) - 2\sin(t); \; s(0) = 0; \; v(0) = 4$$

Find the particle's position function $s(t)$.
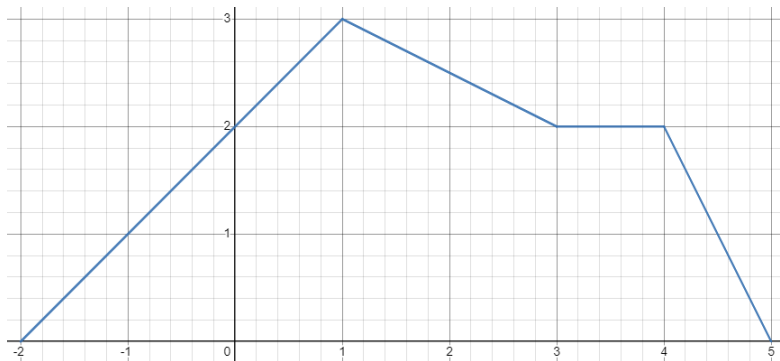
reset

$$\int_0^t a(t)\,dt \implies v(t) - v(0) = 3\sin(t) + 2\cos(t)$$
$$\implies v(t) = 3\sin(t) + 2\cos(t) + 4$$
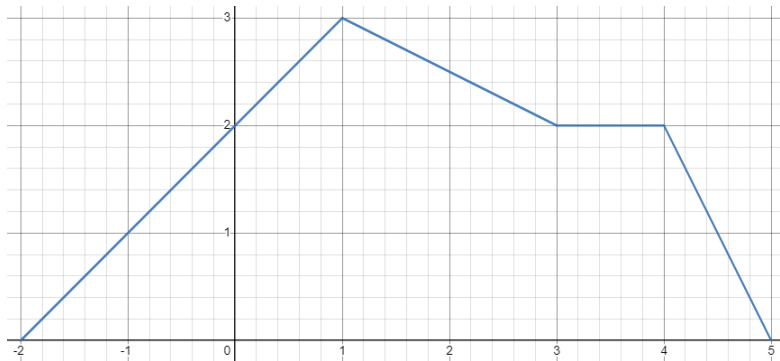
$$\int_0^t v(t)\,dt \implies s(t) - s(0) = -3\cos(t) + 2\sin(t) + 4t$$
$$\implies \boxed{s(t) = -3\cos(t) + 2\sin(t) + 4t}$$

Find the area under the piecewise curve below:

$$2 + 8 + 1 + \frac{3}{2} = \boxed{11 + \frac{3}{2}}$$