Answer on question #74912:

The area of the figure under the curve $\begin{cases} x = 2t - 1 \\ y = t^2 + 5 \end{cases}, -4 \le\ t \le 4$ and up to *X*-axis is equal to $165\frac{1}{3}$.

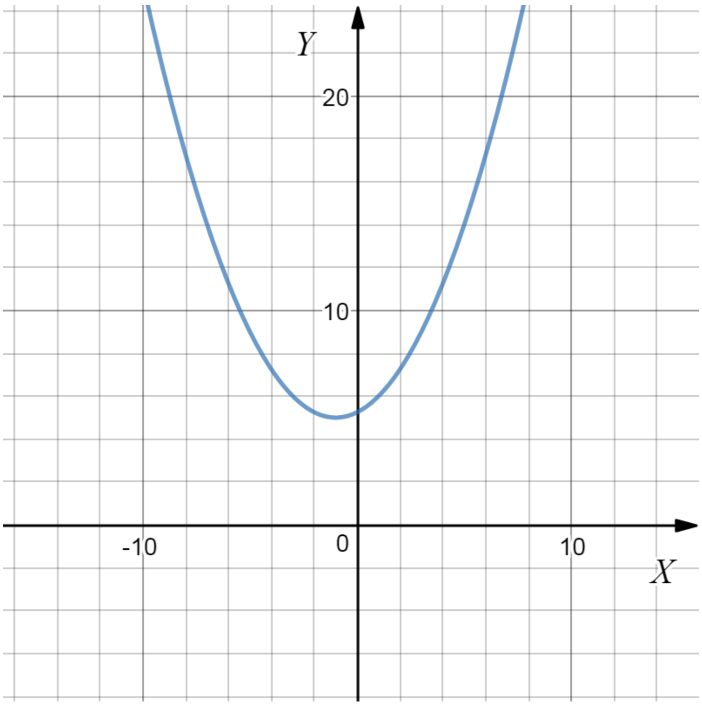
$$\begin{cases} x = 2t - 1 \\ y = t^2 + 5 \end{cases}, -4 \le\ t \le 4.$$

1) Our function is given in parametric form.
   a) $min_{t\in[-4;4]}x = x(-4) = -9;$
      $max_{t\in[-4;4]}x = x(4) = 7.$
      So that the domain of our function is $[-9,7]$.
   b) $y = t^2 + 5$ so that $y \ge 5$, so that the codomain of our function is $[5; +\infty]$.

2) The graph of our function intersects *Y*-axis at
   $x = 2t - 1 = 0;$
   $t = \frac{1}{2}$.
   The graph of our function doesn't intersect *X*-axis because $y \ge 5$.

3) $\frac{dy}{dx} = \frac{y\prime(t)}{x\prime(t)} = \frac{2t}{2} = t;$
   There is local minimum point at $t = 0$:
   $x_{min} = -1; y_{min} = 5.$
   Except that $min_{[-9;7]}y = 5.$

4) $\frac{d^2y}{dx^2} = \frac{1}{2} > 0$. So that our function is strict convex.

5) 

6) The area of the figure under the curve $\begin{cases} x = 2t - 1 \\ y = t^2 + 5 \end{cases}, -4 \le t \le 4$ and up to *X*-axis

$$S = \int_{-9}^{7} y \cdot dx = [x = 2t - 1; dx = 2dt; t\epsilon[-4; 4]] = 2\int_{-4}^{4} (t^2 + 5)dt = 4\int_{0}^{4} (t^2 + 5)dt = 4(\frac{t^3}{3} + 5t)\Big|_0^4 = 4\left(\frac{64}{3} + 20\right) = 165\frac{1}{3}.$$

Answer provided by https://www.AssignmentExpert.com