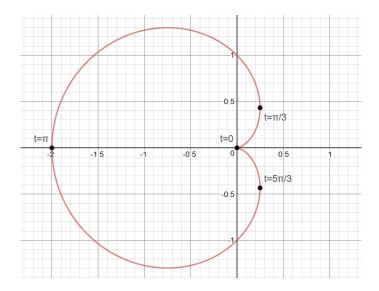Above is a graph of a cardioid, parametrized by

$$x(t) = (1 - \cos t) \cos t$$
$$y(t) = (1 - \cos t) \sin t$$
$$0 \le t \le 2\pi$$

(a) Use the graph to determine when $x(t)$ is increasing/decreasing, and when $y(t)$ positive/negative.

(b) Give an expression for the area enclosed by the cardioid (but do not integrate). You may make use of symmetry.

Consider the parametric curve

$$x(t) = t^3 - 4t$$
$$y(t) = t^2$$
$$0 \leq t \leq 2$$

(a) Without graphing, determine when $x(t)$ is increasing/decreasing, and when $y(t)$ positive/negative.

(b) Give an expression for the area enclosed by the curve and the y-axis (but do not integrate).