

1. Find parametric equations for the following curves, including an interval for the parameter values.
 - (a) The left half of the parabola $y = x^2 + 1$, originating at $(0, 1)$.
 - (b) The line that passes through the points $(1, 1)$ and $(3, 5)$, oriented in the direction of increasing x .
2. A bullet shot with initial velocity v_o from a gun at ground level aimed up at an angle θ travels according to the parametric equations

$$\begin{aligned}x(t) &= v_o t \cos \theta \\y(t) &= v_o t \sin \theta - gt^2.\end{aligned}$$

- (a) Show that the path of the bullet is a parabola.
- (b) How much time elapses before the bullet hits the ground?
- (c) How far does the bullet travel before it hits the ground?
- (d) What is the maximum height reached?
- (e) How should θ be chosen to maximize the range?

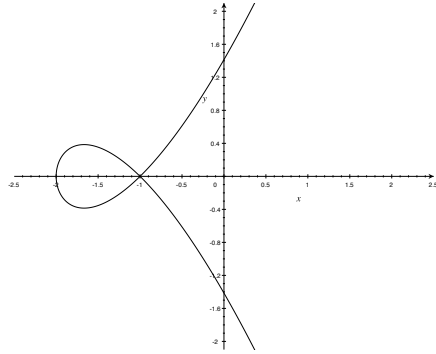
3. Match the following for equations with the four graphs in the accompanying picture. Explain your reasoning.

(i) $x = t^2 - 2, y = t^3 - t$

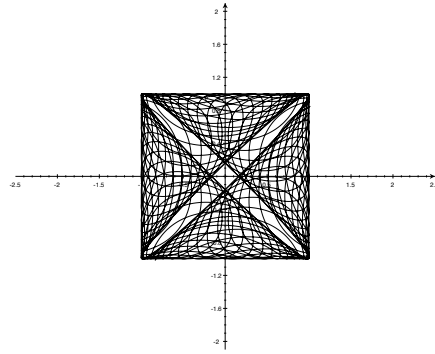
(ii) $x = \cos(t + \sin 50t), y = \sin(t + \cos 50t)$

(iii) $x = t + \cos 2t, y = t - \sin 4t$

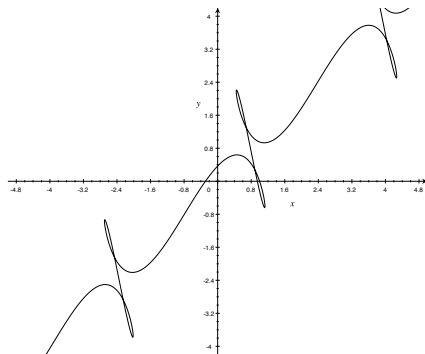
(iv) $x = 2 \cos t + \cos 20t, y = 2 \sin t + \sin 20t$



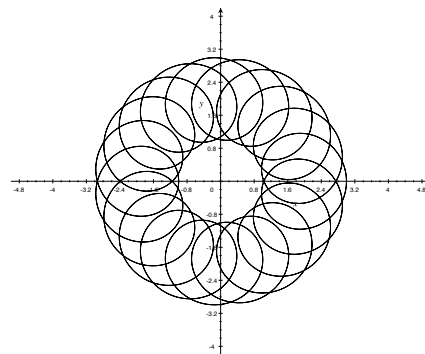
(A)



(B)



(C)



(D)