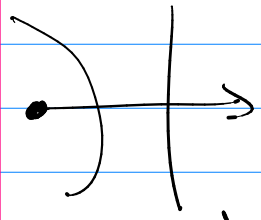
Math 243

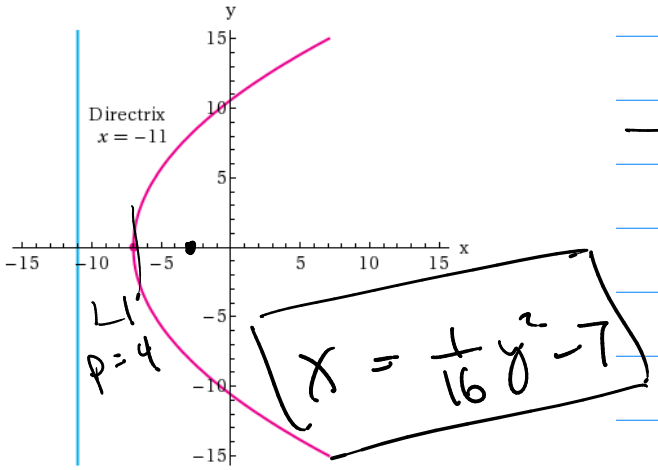
Q's 10.6

$r = \frac{ed}{1 - e\cos\theta}$



$r = \frac{ed}{1+e\cos\theta}$ $x = d$

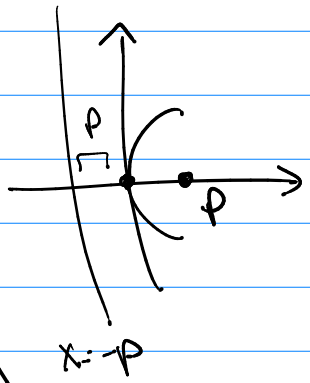
Find an equation, in terms of x and y, for the parabola conic whose graph is shown.



L1

$p = 4$

$x = \frac{1}{16}y^2 - 7$

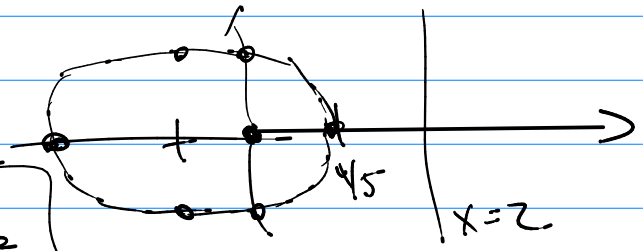


$x = -p$

$x = \frac{1}{4p}y^2$

$r = \frac{4}{3+2\cos\theta}$ → Standard $r = \frac{ed}{1+e\cos\theta}$

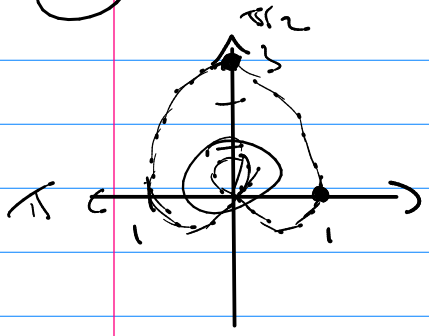
$r = \frac{4/3}{1+\frac{2}{3}\cos\theta}$

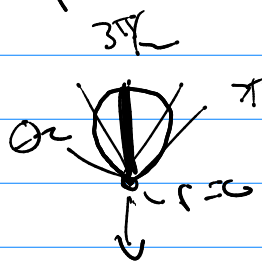


$e = \frac{2}{3}$ so ellipse

$ed = \frac{4}{3}$ → $\frac{2}{3} \cdot d = \frac{4}{3}$ → $d = 2$

Ex area of inner loop of $r = 1 + 2\sin\theta$





$0 = 1 + 2\sin\theta$

$\sin\theta = -\frac{1}{2}$

$\sin\theta = \frac{1}{2}$ $\theta = \frac{\pi}{6}$

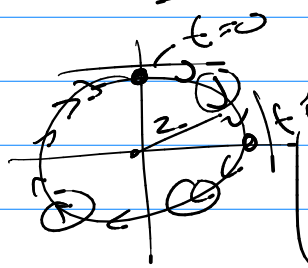
$$A = 2\int_{\pi/6}^{3\pi/2} \frac{1}{2}(1+2\sin\theta)\,d\theta = ?$$

Q: slope = 0 ? horz. slope = ∞ ? vertical

↑ d.n.e

slope $\frac{dy}{dx}$ = expression = $\frac{\text{top}}{\text{bottom}}$ = dne ∞

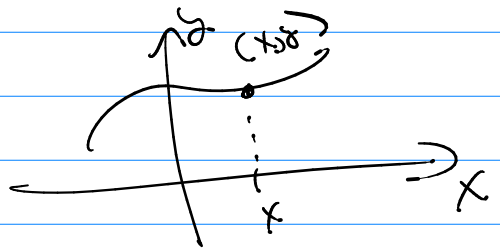
Concavity



$x = 2\sin t$

$y = 2\cos t$

Calculus: (1,2) $y = f(x)$ $f: \text{Real} \to \text{Real}$



① limit
② Deriv.
③ Integrals

→ Now: ch10

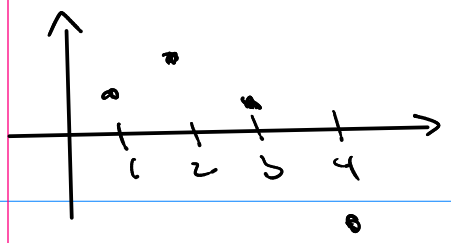
Idea of function moved to ① parametric
② polar

ch11 New "type" of function

map an integer to a set element

typically: $\{1, 2, 3, \ldots\}$ → Set: reals

Domain



$f: \mathbb{Z}^+ \to \mathbb{R}$

positive integers

reals

$f(n)$ $\wedge$ ∋ a pos. integer

ex $f(n) = n^2 + 2$

$f(1) = 3$

$f(2) = 6$

$f(3) = 11$

$f(1, 2, 3, 4, \ldots) \to [3, 6, 11, 16, \ldots]$ sequence

Sequence Notation $f(n) =$ expression

$a_n =$ expression

$\{a_n\} = \{\text{expression}\} = \{a_1, a_2, a_3, \ldots\}$

ex $\{a_n\} = \{n^2 + 2\} = \{3, 6, 11, 18, 27, 38, \ldots\}$

+3 +5 +7 +9 +11

Note: functions for seq's have two forms.

① (closed) ex $a_n = n^2 + 2$

so $a_{100} = 10{,}002$

② open / recursive / inductive