M1ZB3 Lecture 27 (C02) Dr. Wolkowicz March 13

March 13, 2020 11:30 AM

Classes and Monday's test CANCELLED as of end of - updates will be posted. \$ 10.3 Polar Coordinates conta. Polar Curve. r = f(0) Symmetry. curve is symmetric about the POLAR axis ٢ (٣, ٥) Æе -x polar axis $F(\theta) = \cos(\theta)$ f(-o) = cos(-a) = cos(a)

March 13, 2020 11:19 AM

(2) If f(0) = f(0+T) curve is unchanged if r is replaced by -i.e. if rotate curve by 180° (i.e by Trad) (**cr**,**0**) (-r,ə) If $f(\theta) = f(\pi - \theta)$ 3 curve is symmetric about the vertical line (r, 0) ×

March 13, 2020 11:40 AM Cardoid $r = 1 + pin \Theta$ Symmetric about the vertical oxis. 4 leaved-rose. $\vdash = cos(20)$ -symmetric about the polar axis pince cos(20) = cos(-20) symmetric about the vertical axis. $\cos\left(2\left(\Pi-\Theta\right)\right)=\cos\left(2\Pi-2\Theta\right)$ = (0) (-29) $= \cos(2\Theta)$

March 13, 2020 11:46 AM langents to Polar Curves. r = f(o)x = r(0) = f(0) cos(0)y = r pin = f(0) pin(0)Alope of the tangent line. $\frac{dy}{dx} = \frac{dy}{d\theta}$ BEWARE $= \frac{dr}{d0} pin\theta + rcos0$ r is a funchon dr cost - rpine e la $r = f(\theta)$ NOTE: at r=0 this nimplifies to dy = pino = tano dx coso provi provided dr 70

March 13, 2020 11:52 AM $r = 2 \cos \theta$ We phowed this $i_{3} \cdot (x-1)^{2} + y^{2} = 1$ (~Z,I) Find points 311] 1+ where there are vertical and horizontel tangents ! (-瓜)] $X = \Gamma(\theta)(\theta S \theta)$ $r(\theta) 2 carb)$ $\frac{dr}{d\theta} = -2pin\theta$ y = r(0) pin(0) $\frac{dy}{dx} = \frac{dy}{dx} = \frac{dr}{d6} pin + r(e)core$ $\frac{dx}{dx} = \frac{dr}{d6} - r(e)pine$ dr cost - r(b) pind. = - Zpinopino + 2 cosa cosa $-2pin \overline{v}cos \overline{v} - 2cos \overline{v}pin \overline{v}$ $\frac{\cos^2 \Theta - pin^2 \Theta}{- 2 pin \beta (psp)}$ - 2 pino (050

March 13, 2020 11:57 AM horizon tel tangent (usually dy =0, dx ±0 Ato Ato DR just look et numerchor =0 demoningtor fo numercher: $ca^2 \theta - ph^2 \theta = 0$. $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ トニン(当) = 2 - 万. $\Theta = 3\pi \quad \text{gives} \left(-52, 3\pi\right)$ $\Theta = 5\pi give (-52, 5\pi)$ θ=7π gire (√2,7π) (- 元, 辺) (12,-5]) denominator -2 pinocoso 70. Note

Vertical tangents, when dy to, dx to The tangents, or. denominator =0 humerchor =0. denominator: - 2 pint Cost r= 2000 $\beta in \Theta = 0, \quad \Theta = 0, \quad \Pi, \quad Z\Pi$. (2,0), (-2, Π) (2,2 Π) い (つ) む) (つ) む) (つ) む) (つ) む) (つ) む) (つ) む) Co19 = 0 NOTE: the numerator =0 at any of these angles. 94.1 Functions of Several Variables.