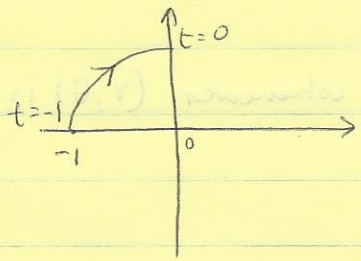
Completion Points = 10
Selected problem points = 10.

HW 5 Solutions
MATH 1930

Sec 11.1 13 $x = t$, $y = \sqrt{1-t^2}$, $-1 \le t \le 0$

$\Rightarrow y = \sqrt{1-x^2}$



Sec 11.2 19 $x = t^3 + t$, $y + 2t^3 = 2x + t^2$

$\Rightarrow \frac{dx}{dt} = 3t^2 + 1$, $\frac{dy}{dt} + 6t^2 = 2\frac{dx}{dt} + 2t$

$\Rightarrow \frac{dy}{dt} = 2(3t^2+1) + 2t - 6t^2 = 2t + 2$

$\therefore \frac{dy}{dx} = dy/dt \Big/ \frac{dx}{dt} = \frac{2t+2}{3t^2+1}$

$\left.\frac{dy}{dx}\right|_{t=1} = \frac{4}{4} = \boxed{1}$

Sec 11.3 $r\cos\theta + r\sin\theta = 1$

$x + y = 1$

$y = -x + 1$

* Line with slope $m = -1$ and y-intercept $b = 1$

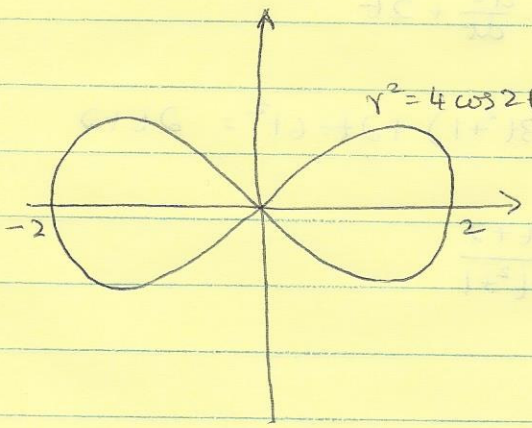
Sec 11.4

13 $r^2 = 4\cos 2\theta$

$(\pm r)^2 = 4\cos 2(-\theta)$

$\therefore$ $(\pm r, -\theta)$ is also on the graph whenever (r,θ) is on the graph.

$\therefore$ The graph is symmetric about the x and the y-axis therefore the graph is symmetric about the origin.



Sec 11.5 23 $r = 1+\cos\theta \Rightarrow \frac{dr}{d\theta} = -\sin\theta$

$$\text{Arc Length} = \int_0^{2\pi} \sqrt{(1+\cos\theta)^2 + (-\sin\theta)^2}\, d\theta$$

$$= \int_0^{2\pi} \sqrt{2+2\cos\theta}\, d\theta = \int_0^{2\pi} \sqrt{\frac{4(1+\cos\theta)}{2}}\, d\theta$$

$$= 2\int_0^{\pi} \sqrt{4\cos^2\frac{\theta}{2}}\, d\theta$$

$$= 4\int_0^{\pi} \cos\frac{\theta}{2}\, d\theta = 4 \cdot 2 \cdot \sin\frac{\theta}{2}\Big|_0^{\pi}$$

$$= \boxed{8}$$