Review 7A

Math 222

1. Convert $r = 4\sec\theta$ to rectangular coordinates and sketch its graph.
2. Sketch the graph of $r = 2 + 3\sin\theta$.
3. Find the eccentricity and directrix of $r = \dfrac{5}{2 - \sin\theta}$. Plot points at multiples of $\frac{\pi}{2}$ to make a sketch of the graph.
4. Find the arc length of the polar curve $r = \theta^2$ between $\theta = 0$ and $\theta = \pi$.
5. Set up the integral that gives the length of the 5-leaved rose $r = 3\cos(5\theta)$.
6. Find $\tan\psi$ for the Archimedean spiral: $r = a + b\theta$.
7. Find the total area inside the loops of the 3-leaved rose $r = 3\cos(3\theta)$.
8. Find the area inside the inner loop of the limaçon $r = 1 - 2\cos\theta$.
9. Set up the integral(s) needed that give the area inside both the circle $r = 2\sin\theta$ and the cardioid $r = 2 - 3\sin\theta$.

Answers to problems above: 1. $x = 4$ (vertical line) 2. 3. $e = \frac{1}{2}$, $y = -5$,

θ	0	$\pi/2$	π	$3\pi/2$
r	5/2	5	5/2	5/3

4. $\frac{(\pi^2+4)^{\frac{3}{2}}}{3} - \frac{8}{3}$ 5. $L = 30\int_0^{\frac{\theta}{10}} \sqrt{\cos^2(5\theta) + 25\sin^2(5\theta)}\,d\theta$ 6. $\tan\psi = \frac{a}{b} + \theta$ 7. $\frac{9\pi}{4}$ 8. $\pi - \frac{3\sqrt{3}}{2}$ 9. $\int_0^{\arcsin(\frac{2}{5})} (2\sin\theta)^2 d\theta + \int_{\arcsin(\frac{2}{5})}^{\frac{\pi}{2}} (2 - 3\sin\theta)^2 d\theta$

Review 7B

Math 222

1. Convert $r = -4\sin\theta$ to rectangular coordinates and sketch its graph.
2. Sketch the graph of $r = 2 - \cos\theta$.
3. Find the eccentricity and directrix of $r = \dfrac{3}{2 + 3\cos\theta}$. Plot points at multiples of $\frac{\pi}{2}$ to make a sketch of the graph.
4. Find the arc length of the polar curve $r = \sin^3\left(\frac{\theta}{3}\right)$ between $\theta = 0$ and $\theta = \pi$.
5. Set up the integral that gives the length of the 8-leaved rose $r = 2\sin(4\theta)$.
6. Find $\tan\psi$ for Fermat's spiral: $r = \sqrt{\theta}$.
7. Find the total area inside both loops of the lemniscate $r^2 = \cos(2\theta)$.
8. Find the area inside 4-leaved rose $r = 2\cos(2\theta)$, but outside the circle $r = 1$.
9. Set up the integral(s) needed that give the area inside the cardioid $r = 1 + \cos\theta$ but outside the circle $r = 4\cos\theta$.
10. There will be a take-home problem.

Answers to problems above: 1. $x^2 + (y+2)^2 = 2^2$ (circle) 2. 3. $e = \frac{3}{2}$, $x = 1$,

θ	0	$\pi/2$	π	$3\pi/2$
r	3/5	3/2	-3	3/2

4. $\frac{\pi}{2} - \frac{3\sqrt{3}}{8}$ 5. $L = 32\int_0^{\frac{\pi}{8}} \sqrt{\sin^2(4\theta) + 16\cos^2(4\theta)}d\theta$ 6. $\tan\psi = 2\theta$ 7. 1 8. $\frac{2}{3}\pi + \sqrt{3}$ 9. $\int_{\arccos(\frac{1}{3})}^{\frac{\pi}{2}} (1+\cos\theta)^2 - (4\cos\theta)^2 d\theta + \int_{\frac{\pi}{2}}^{\pi} (1+\cos\theta)^2 d\theta$ 10.