Review Packet for Final Exam

Material since Exam #3

Math 12-D. Benedetto

Polar Coordinates: For each problem, sketch the polar curve(s) and answer the related question(s).

1. Find the area bounded by $r = 2\sin\theta$.

2. Find the area bounded by one petal loop of the 4 leaved rose $r = 3\sin(2\theta)$.

3. Find the area bounded by $r = \theta$ with $0 \leq \theta \leq 2\pi$

4. Find the area bounded by the cardioid $r = 2 + 2\sin\theta$.

5. Find the area bounded inside $r = 2 + 2\cos\theta$ and outside $r = 3$.

6. Find the area bounded inside $r = 2\sin\theta$ and outside $r = \sqrt{2}$.

7. Find the area bounded inside $r = 3 + 3\sin\theta$ and outside $r = \frac{9}{2}$.

Differential Equations: Solve each of the following differential equations, finding either the general or particular solution, as needed.

8. $\dfrac{dy}{dx} = -6xy$ with $y(0) = 7$

9. $x\dfrac{dy}{dx} - y = x$ with $y(1) = 7$

10. $\dfrac{dy}{dx} = 6x(y-1)^{\frac{2}{3}}$

11. $\dfrac{dy}{dx} + 3y = 2xe^{-3x}$

12. $2x\dfrac{dy}{dx} + y = 10\sqrt{x}$

13. $\dfrac{dy}{dx} = (1+y^2)e^x$

14. $\dfrac{dy}{dx} + 2xy = x$ with $y(0) = -2$

15. $\dfrac{dy}{dx} = \ln x\sqrt{1-y^2}$

16. $\dfrac{dy}{dx} = \dfrac{x\arctan x}{y}$

17. $x^3\dfrac{dy}{dx} + x^2y = 2x^3 + 1$

18. $(1+x)\dfrac{dy}{dx} + y = \cos x$ with $y(0) = 1$

19. $\dfrac{dy}{dx} = 3(y+7)x^2$ is both linear and separable.
Solve it both ways and compare your answers.