Note: Each question is 10 point. Please answer all questions.

1. Use implicit differentiation to find　dy/dx.

$$3x + y + \ln(xy)$$

2. Sketch the graph of the function:

$$y = \ln(x^2 + 1)$$

3. Evaluate the integral of　$\int_1^2 \int_0^x (2y + 3)\,dy\,dx$.

4. Evaluate the integral of　$\int \dfrac{x}{(x+2)(x-3)^2}\,dx$.

5. Evaluate the improper integral.　$\int_{-\infty}^{\infty} xe^{-x^2}\,dx$.

6. Determine the minimum value　of　$f(x,y) = 2x^2 + y^2 + 7$, subject to the constraint $x + y = 18$.

7. Determine the average value of the function　$f(x,y) = 2x + 3y$, over the region defined by $1 \le x \le 4$　and　$0 \le y \le 5$.

8. Obtain a Taylor series about zero for　$g(x) = \ln(1+x)$.

9. To sum the series $\displaystyle\sum_{n=1}^{\infty} \frac{x^n}{n}, x \in (-1,1)$.

10. Use Newton's method to approximate a zero of the function defined by

$$f(x) = x^3 - 3x^2 + 1$$

use three iterations.