1. Determine the values of a, b, and c if the graph of $f(x) = ax^3 + bx^2 + c$ is to have (-1, 1) as a point of inflection of f at which the slope is 2. (10%)

2. Solve $y' = 5x^2 e^{-2y}$. (10%)

3. Evaluate $\int \log(x^2 + 1)dx$. (10%)

4. Determine the third-order Taylor polynomial of $\log\frac{1+x}{1-x}$, at $x_0 = 0$. (10%)

5. Find $\lim_{x\to 0^+}(1+x)^{1/x}$. (10%)

6. (10%) Suppose that Σa_n and Σb_n are positive series. When a_n/b_n converges to a real number A, determine whether each of the following arguments is true or false:
   (a) Σa_n convergent $\Rightarrow$ Σb_n convergent
   (b) Σb_n convergent $\Rightarrow$ Σa_n convergent
   (c) Σa_n divergent $\Rightarrow$ Σb_n divergent
   (d) Σb_n divergent $\Rightarrow$ Σa_n divergent

7. (10%) Explain the concept of linearly independent vectors in an n-dimensional space, and give one linearly independent set and one linearly dependent set of vectors in a 3-dimesional space.

8. (10%) Convert the following mathematical model into matrix form

   Maximize $Z = 5X_1 + 3X_2 + 2X_4$
   Subject to $6X_1 + X_2 + X_3 \le 250$
   $X_1 - X_2 + 2X_3 + 2X_4 \le 200$
   $2X_2 + 5X_4 \le 120$
   $X_1 \ge 0, X_2 \ge 0, X_3 \ge 0, X_4 \ge 0$

9. (10%) In a 3-dimensional space, calculate the volume bounded by planes x = 0, y = 0, z = 0, and bcx + acy + abz = abc for a, b, c > 0.

10. (10%) Interpret the gradient of function f(x,y,z) at point p = (x_0,y_0,z_0).