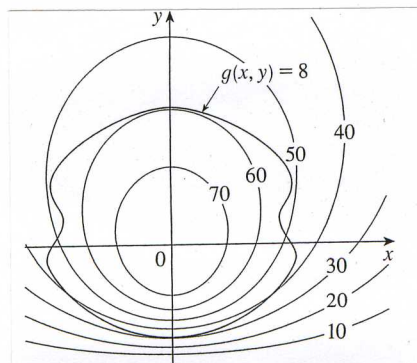


考試時間 120 分鐘，題目卷為兩張紙，共四頁，滿分 120 分。所有題目的答案都請依題號順序依序寫在答案卷上，而非與填充題必須寫在第一頁。答案卷務必寫學號、姓名，題目卷不必繳回。考試開始 30 分鐘後不得入場，開始 40 分鐘內不得離場。考試期間禁止使用字典、計算機及任何通訊器材，違者依作弊論。監試人員不得回答任何關於試題的疑問。 **Questions are to be answered on the answer sheet provided.**

是非題 **True or False** (20 points)，請答 **T** (True) 或 **F** (False)。每題 2 分。
(不需詳列過程，請依題號順序依序寫在答案卷第一頁上。)

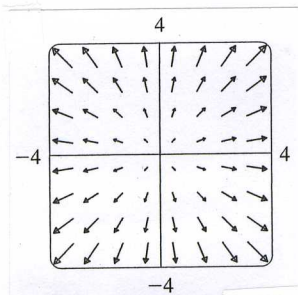
1. The series $\sum_{n=1}^{\infty} \sin n$ is convergent.
2. If the radius of convergence of the power series $\sum_{n=0}^{\infty} c_n x^n$ is 10, then the radius of convergence of the series $\sum_{n=1}^{\infty} n c_n x^{n-1}$ is also 10.
3. The two variable function $f(x, y) = y^2 - x^2$ has *no* extreme value.
4. Newton's Law of Gravitation states that the gravitational force acting on the object at $\mathbf{x} = \langle x, y, z \rangle$ is

$$\mathbf{F} = -\frac{mMG}{|\mathbf{x}|^2} \mathbf{x}.$$
5. The vector field $\mathbf{F} = y^2 z^3 \mathbf{i} + 2xyz^3 \mathbf{j} + 3xy^2 z^2 \mathbf{k}$ is conservative.
6. The following plot shows contour lines of $f(x, y)$ and the curve of the equation $g(x, y) = 8$. According to the plot, the maximum of f subject to the constraint that $g(x, y) = 8$ is 70.



(下頁還有試題)

7. The following plot matches the gradient vector field ∇f of $f(x, y) = (x + y)^2$.



8. Suppose C is a counterclockwise simple closed curve in the xy -plane, and R is the region bounded by C . Then the area of R equals $\int_C x dy$.

9. If C is the line segment connecting from the point (x_1, y_1) to the point (x_2, y_2) , then

$$\int_C x dy - y dx = x_1 y_2 - x_2 y_1.$$

10. There is a vector field \mathbf{F} such that $\text{curl}\mathbf{F} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$.

填充題 **Short answer questions** (40 points), 每題 5 分。

(不需詳列過程，僅將答案依題號順序依序寫在答案卷第一頁上即可。)

1. Find a power series representation for $\ln(1 - x)$.

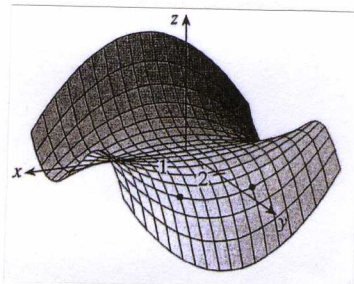
Answer : _____.

2. Determine the signs (+ for positive, - for negative) of the partial derivatives for the function f whose graph is shown below. One point for each correct sign.

2.1 $f_x(1, 2)$. 2.2 $f_y(1, 2)$.

2.3 $f_{xx}(1, 2)$. 2.4 $f_{yy}(1, 2)$.

2.5 $f_{xy}(1, 2)$.



Answer : _____.

(下頁還有試題)

