國立臺北大學 111 學年度日間學士班轉學生招生考試試題

學制系級：統計學系日間學士班 2 年級

科　　目：微積分

□可　☑不可 使用計算機

一、單選題（每題 10 分，請將單選題答案，依下列表格的樣式寫在答案卷上）

1	2	3	4	5	6

1. Find all critical points for the function $f(x,y) = x^3 - y^3 + 33xy$ and classify each as a relative maximum, a relative minimum, or a saddle point.
   (A) f has a saddle point at (11,−11) and a relative minimum at (0,0).
   (B) f has a saddle point at (0,0) and a relative maximum at (11,−11).
   (C) f has a saddle point at (0,0) and a relative minimum at (11,−11).
   (D) f has a saddle point at (11,−11) and a relative maximum at (0,0).

2. Find the relative extrema of the function $f(x) = \frac{1}{\sqrt{3\pi}} e^{-x^2/2}$. Round your answer to one decimal place.
   (A) Relative minimum is (0,0.3).
   (B) Relative minimum is (0,−0.3); relative maximum is (1,0.3).
   (C) Relative minimum is (−1,−0.3); relative maximum is (1,0.3).
   (D) Relative maximum is (0,0.3).

3. A bus company will charter a bus that holds 52 people to groups of 34 or more. If a group contains exactly 34 people, each person pays $65. In large groups, everybody's fare is reduced by $1 for each person in excess of 34. Determine the size of the group for which the bus company's revenue will be greatest.
   (A) 34 with revenue $2210.
   (B) Groups of 49 or 50 with revenue $2450.
   (C) Groups of 49 or 50 with revenue $2210.
   (D) 34 with revenue $2450.

4. Determine whether $\lim_{x\to 3} \sqrt{2x-6}$ exists.
   (A) $\lim_{x\to 3} \sqrt{2x-6}$ does not exist.
   (B) $\lim_{x\to 3} \sqrt{2x-6} = 0$.
   (C) $\lim_{x\to 3} \sqrt{2x-6} > 0$.

5. Suppose a person standing at the top of a building 240 feet high throws a ball vertically upward with an initial velocity of 32 ft/sec. When is the velocity 0? What is the significance of this time?
   Hint: Suppose the height of the ball above the ground at time t is $H(t) = -16t^2 + b\,t + c$ feet.
   (A) The ball is at its lowest point when $t = 3$ second.
   (B) The ball is at its lowest point when $t = 2$ second.
   (C) The ball is at its highest point when $t = 1$ second.
   (D) The ball is at its highest point when $t = 5$ second.

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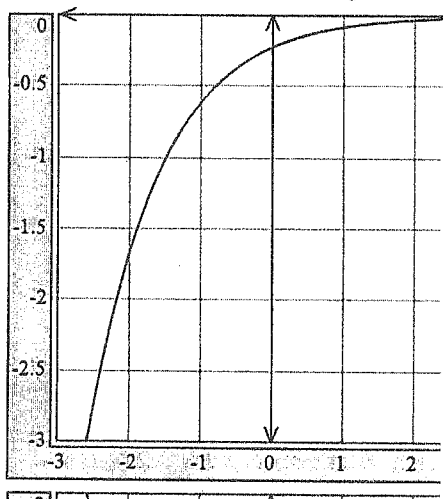
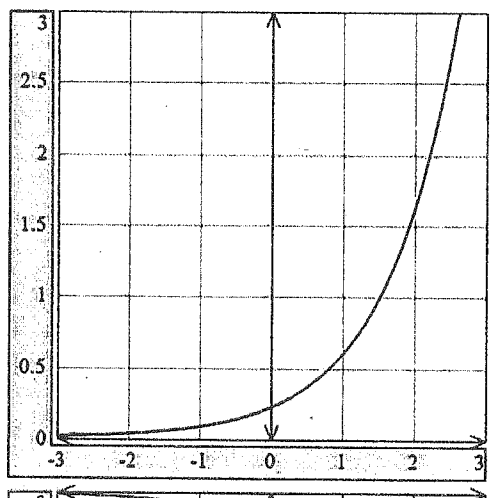
6. Choose the correct sketch of the indicated level curve $f(x,y)=C$ for the given constant C.
$f(x,y)=9ye^x;\ C=2.$

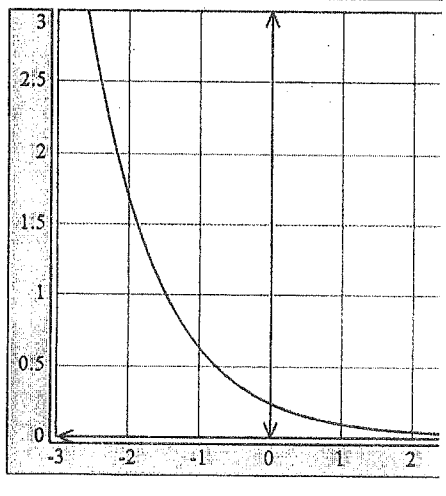
(A)



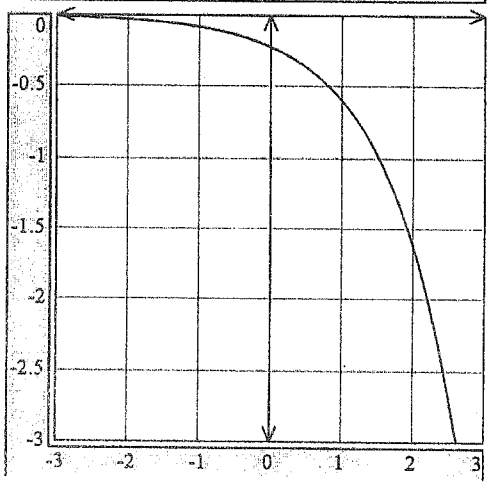
(B)



(C)



(D)



二、計算題（每題 10 分，請詳列過程於答案卷上）

1. Evaluate the integral $\int_0^1\int_{x^2}^1 xe^{y^2}dydx.$
2. Use a linear approximation for values of the function $f(x,y)=2x^2+4y^2$ near the points (1, 2) to approximate the value of $f(1.2,2.1)$.
3. Find $\int 2x^3\ln x dx.$
4. Find the volume of the solid obtained by rotating the region bounded by the graphs of $f(x)=\sqrt{x}$ and $g(x)=x^2$ about the x-axis.

試題隨卷繳交