

## 4期生数学サブゼミテスト⑮

About 20 minutes

### NOTICE

- 1 All the numbers in this test are real number, if there is no notice.
- 2 Hurry up as fast as possible.
- 3 If you have any questions, raise your hand quietly and let officer know.
- 4 You can use pencil and ruler.
- 5 You must answer on “answer sheet” differentiated from “question sheet”. If you answer on “question sheet”, you will get no score with the answers.
- 6 Write your name at the top space on the answer sheet.
- 7 You can also get some scores from the process of answering.  
In other word, you must write the process.

Answer in Japanese or English.

1. Differentiate these functions.

$$(1) y = \sqrt{x}(x^2 + 2x) \quad (2) y = \frac{2x-1}{x^2+1} \quad (3) y = (\sqrt{x} + 2)^4$$

$$(4) y = \frac{1}{x^3 - 2x - 6} \quad (5) y = \sqrt{(x^2 - 1)^3} \quad (6) y = (3x - 1)(x^2 + 2x - 1)^3$$

2. For  $f(x, y) = \frac{x}{y}$ ,

$$\text{Find } \frac{\partial}{\partial x} f(x, y), \frac{\partial}{\partial y} f(x, y), \frac{\partial^2}{\partial x^2} f(x, y), \frac{\partial^2}{\partial y^2} f(x, y), \frac{\partial^2}{\partial xy} f(x, y).$$

3. Calculate next indefinite integrals.

$$(1) \int (x^3 + 6x^2 - 3x + 1) dx \quad (2) \int (2x + 1)(x - 3) dx \quad (3) \int (x - 3)^4 dx$$

$$(4) \int_1^2 (x - 1)(x^2 + 1) dx \quad (5) \int_{-2}^0 (x + 2)^3 dx$$