I.　(50 points) Fill in the following blanks.

1.　If $g(x) = xe^{5x+3}$, then $g'(x) =$ _____(1)_____.

2.　If $g(x) = e^{3\sin(2x)}$, then $g'(x) =$ _____(2)_____.

3.　Solve the initial value problem $y' + y = e^x$, $y(0) = 5$. Then, we have $y =$ _____(3)_____.

4.　Suppose $2^x = 3(5^x)$. Then, $x =$ _____(4)_____.

5.　The value of $\int_2^4 \frac{dx}{x^2-1}$ is _____(5)_____.

6.　The value of $\lim\limits_{x\to 0} \frac{x^2}{\sin^2 x}$ is _____(6)_____.

7.　Which of the following 3 series is/are divergent? _____(7)_____

　　(a) $\sum\limits_{n=1}^{\infty} \frac{n^2+1}{5n^2+9}$　(b) $\sum\limits_{n=1}^{\infty} (-1)^{n-1} e^{-n}$　(c) $\sum\limits_{n=1}^{\infty} \frac{n!}{n^2}$

8.　Consider the conic section $4x^2 + y^2 + 8x - 6y + 4 = 0$. Then its center point $(x, y) =$ _____(8)_____.

9.　Do the Cartesian coordinates $(1, 1)$ match the polar coordinates $\left(\sqrt{2}, \frac{\pi}{4}\right)$? _____(9)_____ (Yes or No)

10.　If $f(x) = \frac{1}{x}$, then $f'''(1) =$ _____(10)_____.

II.　(50 points) Fill in the following blanks.

1.　Find the general Taylor polynomial formula for e^{-x^2} around $x = 0$. _____(1)_____

2.　The average value of function $f(x) = \sin(\pi x)$ over the interval $[0, 1/2]$ is _____(2)_____.

3.　The value of $\int_0^1 \frac{dx}{2x^2+5x+2}$ is _____(3)_____.

4.　The range (or interval) of x that makes series $\sum\limits_{n=0}^{\infty} \frac{(-2)^n (x+4)^n}{n+3}$ convergent is _____(4)_____.

5.　Compute the area enclosed between the graphs $y = 1 - x^2$ and $y = 3 - 3x$. _____(5)_____.

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