



填充題共 20 題，每題 5 分

1. Please solve the inequality $|x-1| - |x-3| \geq 5$
2. Find the value of a such that the $\lim_{x \rightarrow -2} \frac{3x^2 + ax + a + 3}{x^2 + x - 2}$ exists.
3. For a function $f(x) = x^2 - x - 4$, please find a number δ such that if $|x-2| < \delta$ then $|f(x)+2| < 1$.
4. Find the limit $\lim_{x \rightarrow 2} \left(\frac{1}{x-2} - \frac{1}{x^2 - 3x + 2} \right)$
5. Please find the normal line of the tangent for equation $x^2 + xy + y^2 = 3$ at point $(1, 2)$.
6. Find the limit value of $\lim_{x \rightarrow -1} \frac{\sin(x+1)}{x^2 - 2x - 3}$.
7. A boat is pulled into a dock by a rope attached to the bow of the boat and pass through a pulley on the dock that is 1 m higher than the bow of the boat. If the rope is pulled in at the rate of 1 m/s, how fast is the boat approaching the dock when it is 8 m from the dock?
8. If $f(2)=8$ and $f'(x) \geq 5$ for $2 \leq x \leq 6$, how small can the $f(6)$ possible be?
9. Using Newton's method to find a root of the equation $x^5 = 5x - 2$. Calculate two iterations.
10. Find the limit value of $\lim_{x \rightarrow \infty} (xe^{1/x} - x)$.
11. Find the sum of the series $1 + \sum_{n=1}^{\infty} (-1)^n \left(\frac{e^n}{n!} \right)$
12. Find the radius of convergence of the series $\sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^2} x^n$
13. Find $\int_0^{\pi/2} \frac{\sin x}{1 + \cos x^2} dx$
14. If $f(x) = x + x^2 + e^x$ and $g(x) = f^{-1}(x)$, find $g'(1)$.
15. Find $\int_0^{\ln 10} \frac{e^x \sqrt{e^x - 1}}{e^x + 8} dx$
16. Find $\int_0^1 \frac{\ln x}{\sqrt{x}} dx$
17. $y'+y = \sqrt{x}e^{-x}$, $y(0) = 3$, find $y(x)$



18. Find $\iint_D (x^2 + y^2)^{3/2} dA$, where D is the region in the first quadrant bounded by the lines $y = 0$ and $y = \sqrt{3}x$ and the circle $x^2 + y^2 = 9$.
19. Find the maximum rate of change of f at the given point and the direction in which it occur.
 $f(x, y, z) = \ln(xy^2z^3)$, $(1, -2, -3)$
20. $yz = \ln(x + z)$, find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$.