

诚信应考,考试作弊将带来严重后果!

华南理工大学期末考试

《2022 mid-exam CALCULUS》试卷

- 注意事项: 1. 考前请将密封线内填写清楚;
2. 所有答案请直接答在试卷上(或答题纸上);
3. 考试形式: 闭卷;
4. 本试卷共 A 和 B 大题, 满分 100 分, 考试时间 120 分钟。

A 题题号	1	2	3	4	5	6	7	8	9	10
小题得分										
B 题题号	1	2	3	4	5	6	7	8	9	10
小题得分										
合计得分										

A. Answer the questions (50):

(1) Let $f(x) = \frac{1}{(x+1)(x+2)}$. Find $f^{(n)}(0)$

(2) Find the $\lim_{n \rightarrow \infty} (2^n + 3^n + 4^n)^{\frac{1}{n}} =$

(3) Calculate $\int_{-2007}^{2007} (|x| \sin^{15} x + x e^{x^4} + 1) dx$

(4) Find the dy/dx , where $x(t) = \int_0^t e^{t^2} dt$, $y(t) = t^t$

(5) Find the limit $\lim_{x \rightarrow +\infty} \left(\frac{x-2}{x+2}\right)^x$

(6) Find the dy/dx , where $x^y + y^x = \int_3^x e^{-t^2} dt + \int_2^y \sin t^2 dt + 1$

(7) Find the length of the curve $y = \int_1^x \sqrt{u^3 - 1} du$, $1 \leq x \leq 2$

(8) Find the dy/dx where $f(x) = \frac{(x^2 + 3)^{2/3} (3x + 1)^x}{(\arcsin x)^4}$

(9) Prove the limit $\lim_{x \rightarrow 4} (2x + 3) = 11$

(10) $\int \frac{1}{x(1+x^{2007})} dx =$

B. Evaluate the problems (50):

(1) Find the limit $\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{n}{n^2 + k^2}$

(2) Find the volume of the solid generated by revolving the region bounded by the curves

$x = \sqrt{y}$ and $x = \frac{y^3}{32}$ about the x-axis.

(3) Solve integration $\int \frac{1}{(1+x^2)^{\frac{2}{3}}} dx$

(4) Evaluating the integration $\int_c^{2c} \frac{x dx}{\sqrt{x^2 + xc - 2c^2}}, \quad c > 0$.

(5) Determine the monotonicity and concavity of function $f(x) = \frac{x}{1+x^2}$.

(6) Find $G'(x)$, if $G(x) = \int_{\cos x}^{\sin x} \frac{x du}{\sqrt{u^2 + c^2}}, \quad c > 0$

(7) Determine constants a, b, c so that $\lim_{x \rightarrow 1} \frac{ax^4 + bx^3 + 1}{(x-1)\sin \pi x} = c$

(8) Assume that $u_1 = \sqrt{3}$ and $u_{n+1} = \sqrt{3 + u_n}$

determine a convergent sequence and find $\lim_{n \rightarrow \infty} u_n$.

(9) Proof the limit $\lim_{n \rightarrow \infty} \int_0^1 \frac{x^n}{1+x} dx = 0$

(10) Find the limit $\lim_{x \rightarrow +\infty} \left(\frac{x-2022}{x+2022} \right)^{\sin x}$