قائمة الاسئلة

رياضيات 2- كلية الهندسة - قسم العلوم الاساسية (ميكاترونكس - طبية حيوية) - المستوى الاول- 3ساعات - درجة هذا الاختبار (60)

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1) The antiderivative of $f(x) = x^n$ where $n = -1$ is

**A** $\frac{x^{n+1}}{n+1} + c$

**B** $\frac{x^{-1}}{-1} + c$

**C** $\ln x + c$

**D** None of those.

1) - A
2) - B
3) + C
4) - D

2) $\int \frac{x^3+3}{x^2} dx = \ldots\ldots$

**A** $\frac{\int (x^3+3)dx}{\int x^2 dx}$

**B** $\int \left(x + \frac{3}{x^2}\right) dx$

**C** $\int \left(\frac{1}{x} + \frac{3}{x^2}\right) dx$

**D** None of those.

1) - A
2) + B
3) - C
4) - D

3) $\sum_{k=0}^{4} \frac{1}{k^2+1} = \ldots\ldots$

**A** 2

**B** $\frac{60}{133}$

**C** 2.2

**D** $\frac{137}{60}$

1) - A
2) - B
3) - C
4) + D

4) The upper sum the area of the region bounded by the graph $f(x) = x^3$ the $x$-axis, and the vertical lines $x = 0$ and $x = 1$ is

**A** $\frac{1}{4}+\frac{1}{2n}+\frac{1}{4n^2}$

**B** $\frac{1}{4}-\frac{1}{2n}-\frac{1}{4n^2}$

**C** $\frac{1}{4}+\frac{1}{4n}+\frac{1}{2n^2}$

**D** $\frac{1}{4}-\frac{1}{4n}-\frac{1}{2n^2}$

1) + A
2) - B
3) - C
4) - D

5) Which statement is false

**A** $\frac{n(n+1)}{2}$

**B** $\frac{n^2(n+1)}{4}$

**C** $\frac{n^2(n+1)^2}{4}$

**D** $\frac{n(n+1)(2n+1)}{6}$

1) - A
2) + B
3) - C
4) - D

6) If $F(x) = \int_2^x e^{t^2}\,dt$, then $F'(x) = \ldots\ldots$

**A** $e^{x^2}$

**B** $e^{t^2}$

**C** $2x\,e^{x^2}$

**D** $e^{t^2} - e^4$

1) + A
2) - B

3) - C
4) - D

7) If $f(x)$ is even function and $\int_{-4}^{4} f(x)\,dx = 30$, then $\int_{0}^{-4} f(x)\,dx = \ldots\ldots$

**A** 30
**B** 15
**C** $-30$
**D** $-15$

1) - A
2) - B
3) - C
4) + D

8) $\int_{0}^{2} |kx-1|\,dx = \ldots\ldots,$

**A** $\frac{1}{2k} + 2\,(k-1)$
**B** $2\,(k-1)$
**C** $\frac{1}{k} + 2\,(k-1)$
**D** $\frac{1}{2k} + 2\,(1-k)$

1) - A
2) - B
3) + C
4) - D

9) $\int \frac{e^{\frac{1}{x}}}{x^2}\,dx$

**A** $e^{\frac{1}{x}} + c$
**B** $-e^{\frac{1}{x}} + c$
**C** $e^{\frac{1}{x^2}} + c$
**D** None of those.

1) - A
2) + B
3) - C
4) - D

10)

The value of $\int_{-\pi}^{\pi}(\sin ax \ \sin bx)dx$ where $0 < a < b$, and $a, b \in Z$ is .....

**A** $\pi\,(\cos b\,\pi - \cos a\pi)$

**B** $2\pi(b-a)$

**C** $zero$

**D** $\pi$

1) - A
2) - B
3) + C
4) - D

11) The Fundamental Theorem of Calculus cannot be apply for .....

**A** $\int_a^b \sin x^2\ dx$

**B** $\int_a^b x \sin x^2\ dx$

**C** $\int_a^b \sqrt{25-x^2}\ dx$

**D** None of those.

1) + A
2) - B
3) - C
4) - D

12) $\int \frac{x^2-x+1}{x^2+1}dx = \ldots\ldots\ldots$

**A** $x+\frac{1}{2}\ln(x^2+1)+c$

**B** $x-\frac{1}{2}\ln(x^2+1)+c$

**C** $x-\ln(x^2+1)+c$

**D** None of those.

1) - A
2) + B
3) - C
4) - D

13)

$\int \frac{x+2}{\sqrt{4-x^2}}\,dx = \ldots\ldots\ldots$

**A** $\frac{1}{\sqrt{4-x^2}} + 2\sin^{-1}\frac{x}{2} + c$

**B** $\sqrt{4-x^2} + 2\sin^{-1}\frac{x}{2} + c$

**C** $\ln\sqrt{4-x^2} + c$

**D** $-\sqrt{4-x^2} + 2\sin^{-1}\frac{x}{2} + c$

1) - A
2) - B
3) - C
4) + D

14) $\int \frac{1}{u\sqrt{a^2-u^2}}\,du = \ldots\ldots\ldots$

**A** $-\frac{1}{a}\ln\frac{a-\sqrt{a^2-u^2}}{|u|} + c$

**B** $-\frac{1}{a}\ln\frac{u+\sqrt{a^2-u^2}}{|a|} + c$

**C** $-\frac{1}{a}\ln\frac{a+\sqrt{a^2-u^2}}{|u|} + c$

**D** $\frac{1}{a}\ln\frac{a+\sqrt{a^2-u^2}}{|u|} + c$

1) - A
2) - B
3) + C
4) - D

15) The volume of the solid formed by revolving the region bounded by the graphs of $y = x^2 + 1$, $y = 0$, $x = 0$, *and* $x = 1$ about $x - axis$ is equal to .....

**A** $\frac{3\pi}{2}$

**B** $\frac{2\pi}{3}$

**C** $\pi$

**D** $\frac{\pi}{2}$

1) + A
2) - B
3) - C
4) - D

16) The area of the surface formed by revolving the graph of $y = x^3$ on the interval $[0,1]$ about $x - axis$ is

**A** $\frac{\pi}{36}\left(10^{\frac{3}{2}} - 1\right)$

**B** $\frac{\pi}{27}\left(\sqrt{1000} - 1\right)$

**C** $\frac{\pi}{18}\left(\sqrt{1000} - 1\right)$

**D** None of those.

1) - A
2) + B
3) - C
4) - D

17) $\int x^2 \ln x \, dx = \ldots\ldots\ldots$

**A** $x^2 \ln x + x(\ln x - 1) + c$

**B** $\frac{1}{3}x^3 \ln x - \frac{1}{9}x^3 + c$

**C** $\frac{1}{9}x^3 \ln x - \frac{1}{3}x^3 + c$

**D** $\frac{1}{3}x^2 \ln x - \frac{1}{9}x^3 + c$

1) - A
2) + B
3) - C
4) - D

18) $\int \tan^4 x \, dx = \ldots\ldots\ldots$

**A** $\frac{\tan^3 x}{3} - \tan x + c$

**B** $\frac{\sec^3 x}{3} - \tan x + x + c$

**C** $\frac{\tan^3 x}{3} - \tan x - x + c$

**D** None of those.

1) - A
2) - B
3) - C

4) + D

19) $\int \frac{1}{x^2+4x+4}\,dx = \int \left(\frac{F}{x+2} + \frac{E}{(x+2)^2}\right)dx$ where

**A** $F = 1,\ E = -1$

**B** $F = -1,\ E = 1$

**C** $F = 0,\ E = 1$

**D** $F = 1,\ E = 0$

1) - A
2) - B
3) + C
4) - D

20) $\int_0^{\infty} t\, e^{-st}\, dt = \ldots.$

**A** $\frac{1}{s}$

**B** $\infty$

**C** $zero$

**D** $\frac{1}{s^2}$

1) - A
2) - B
3) - C
4) + D

21) The integral $\int_1^{\infty} \frac{1}{x^p}\, dt$

A. Converge if $p < 1$, and diverge if $p \geq 1$

B. Converge if $p > 1$, and diverge if $p < 1$ only

C. Converge if $p > 1$, and diverge if $p \leq 1$

D. None of those.

1) - A
2) - B

3) + C
4) - D

22) $\int_{-1}^{3} \frac{1}{x^2} dx$ is equal to

**A** $-\frac{4}{9}$

**B** $-\frac{1}{3}\left(\frac{8}{9}\right)$

**C** $\frac{4}{9}$

**D** None of those.

1) - A
2) - B
3) - C
4) + D

23) $f(x) = \frac{4}{2+x}$, equal to

A $f(x) = \sum_{n=0}^{\infty} 2(-1)^n \left(\frac{x}{2}\right)^n$

B $f(x) = \sum_{n=0}^{\infty} (\frac{x}{2})^n$

C $f(x) = \sum_{n=0}^{\infty} (-\frac{x}{2})^n$

D $f(x) = \sum_{n=0}^{\infty} 2(\frac{x}{2})^n$

1) + A
2) - B
3) - C
4) - D

24) The radius of convergence of $\sum \frac{x^n}{n}$ is ... ...

A $R = 0$

B $R = 1$

C $R = \infty$

**D** None of those.

1) - A

2) + B
3) - C
4) - D

25)

The power series $\sum \frac{x^n}{n}$ diverge at ..... .....

A $x = 1$

B $x = -1$

C $x = 0$

**D** $]-1,1[$

1) + A
2) - B
3) - C
4) - D

26) Find the incorrect Theorem

A For $0 < a_n$, $0 < b_n \ \forall n$, and $\lim_{n\to\infty}\left(\frac{a_n}{b_n}\right) = L$, where $L$ is finite and positive. Then $\sum a_n$ and $\sum b_n$ both converge or diverge.

B For $0 \le a_n \le b_n \ \forall n$, If $\sum_{n=1}^{\infty} a_n$ diverge , then $\sum_{n=1}^{\infty} b_n$ diverge

C If the series $\sum a_n$ converge, then $\lim_{n\to\infty} a_n \neq 0$.

D If $\lim_{n\to\infty} a_n \neq 0$, then $\sum a_n$ diverge.

1) - A
2) - B
3) + C
4) - D

27) The Power series of $f(x) = \frac{1}{1+x}$ is

A $f(x) = 1 - x + x^2 - x^3 + \cdots.$

B $f(x) = 1 + x + x^2 + \cdots.$

C $f(x) = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} \ldots.$

D None of those.

1) + A
2) - B

3) - C
4) - D

28) $\int \sqrt{a^2 - u^2}\, du = \ldots\ldots$

A $\frac{a^2}{2}\left(\sin^{-1}\left(\frac{u}{a}\right) + \frac{u\sqrt{a^2-u^2}}{a^2}\right) + c$

B $\frac{a^2}{2}\left(\sin^{-1}\left(\frac{u}{a}\right) - \frac{u\sqrt{a^2-u^2}}{a^2}\right) + c$

C $\frac{a^2}{2}\left(\sin^{-1}\left(\frac{u}{a}\right) + \frac{a\sqrt{a^2-u^2}}{u^2}\right) + c$

D None of those.

1) + A
2) - B
3) - C
4) - D

29) $\int \frac{x+1}{\sqrt{x}} dx = \ldots\ldots\ldots\ldots\ldots\ldots$

a. $\frac{2}{3}\sqrt{x}(x+3) + c$

b. $\frac{2}{3}x^{\frac{3}{2}} + \sqrt{x} + c$

c. $\frac{3}{2}x^{\frac{3}{2}} + \frac{1}{2}\sqrt{x} + c$

d. $\frac{2}{3}x^{\frac{3}{2}} + \frac{1}{2}x^{-\frac{1}{2}} + c$

1) + A
2) - B
3) - C
4) - D

30) To solve the integral $\int_{\sqrt{3}}^{2} \frac{\sqrt{x^2-3}}{x} dx$ , we can use the substitution

**A.** $x = \sqrt{3}\sin\theta$

**B.** $x = \sqrt{3}\tan\theta$

**C.** $x = \sqrt{3}\sec\theta$

**D.** None of these.

1) - A
2) - B
3) + C

4) - D