Grade 12 Advanced

Unit 5

Integration

Multiple Choice questions

2022 – 2023

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Unit 5
Multiple – Choice Questions

1) If $F(x)$ and $G(x)$ are both antiderivatives for the function $f(x)$ then $(3F-2G)'(x)$ is:

A) 0 B) 1 C) $f'(x)$ D) $f(x)$

2) If $\int\left(f(x)+2\right).dx=x^3+ax^2+c$ and $f(1)=3$ then the value of a is:

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

3) If $\int f(x+2).dx=\sqrt{x}+x$ then $f(x)$ is:

A) $\frac{1}{2\sqrt{x}}+1$ B) $\sqrt{x}+1$ C) $\frac{1}{2\sqrt{x-2}}+1$ D) $\sqrt{x-1}+1$

4) If $\int_1^3 f(x).dx=4$, $\int_3^{10} f(x).dx=6$, $\int_1^6 5f(x).dx=3a$, $\int_6^{10} 5f(x).dx=2a$ then a equals:

A) -2 B) 2 C) -10 D) 10

5) If $\frac{dy}{dt}=t^2-t-1$ and $y(1)=0$ then $y(0)$ equals:

A) $\frac{7}{6}$ B) $\frac{5}{6}$ C) $\frac{-7}{6}$ D) $\frac{-5}{6}$

6) If $\int_0^k \frac{\sec^2 x}{1+\tan x}.dx=\ln 2$ then k equals:

A) $\frac{\pi}{6}$ B) $\frac{\pi}{4}$ C) $\frac{\pi}{3}$ D) $\frac{\pi}{2}$

7) If F, f are continuous functions such that $F'(x)=f(x)$ for all values of x

then $\int_a^b f(x).dx$ is:

A) $F'(a)-F'(b)$ B) $F'(b)-F'(a)$ C) $F(a)-F(b)$ D) $F(b)-F(a)$

8) If $\int_0^k (2kx - x^2).dx = 18$ where k is a constant, then the value of k is:

A) -9 B) -3 C) 3 D) 9

9) Evaluate the integral $\int \frac{x}{x^2+9}.dx$

A) $\frac{1}{2}\ln|x+9|$ B) $\frac{1}{2}\ln|x^2+9|$ C) $\ln|x^2+9|$ D) $\ln|x+9|$

10) Evaluate the integral $\int_0^4 \frac{x}{x+9}.dx$ (Hint: Use substitution)

A) $4 - 9\ln 13 + 9\ln 9$ B) $13 - 9\ln 4 + \ln 3$ C) $\frac{1}{9\ln 13} - \ln 3$ D) $4 - 13\ln 9 + 3\ln 18$

11) For which value of p does $\int_0^1 \frac{1}{x^p}.dx = 1.25$

A) 0.5 B) 2.5 C) 5 D) 0.2

12) Evaluate $\int_{-1}^{1} \frac{1}{x^{2/3}}.dx$

A) 0 B) 6 C) 9 D) Noneof these

13) If f is a linear function and $0 < a < b$ then $\int_a^b f''(x).dx =$

A) 0 B) 1 C) $\frac{ab}{2}$ D) $b - a$

14) $\int_1^e \frac{x^2-1}{x}.dx =$

A) $e - \frac{1}{e}$ B) $e^2 - e$ C) $\frac{e^2}{2} - e + \frac{1}{2}$ D) $\frac{e^2}{2} - \frac{3}{2}$

15) If $F(x) = \int_0^x \sqrt{t^3+1}.dt$ then $F'(2) =$

A) -3 B) -2 C) 2 D) 3

16) Evaluate $\int_{0}^{\ln 2\pi} e^x \cos e^x .dx$

A) $e^{2\pi}$ B) $e^{2\pi}-1$ C) $-\sin(1)$ D) $\sin(1)$

17) What are all values of k for which $\int_{-3}^{k} x^2 .dx = 0$

A) -3 B) 0 C) 3 D) $-3 \text{ and } 3$

18) If f is a continuous function and if $F'(x) = f(x)$ for all real numbers x,

then $\int_{1}^{3} f(2x).dx =$

A) $2F(3)-2F(1)$ B) $\frac{1}{2}F(6)-\frac{1}{2}F(2)$ C) $\frac{1}{2}F(3)-\frac{1}{2}F(1)$ D) $2F(6)-2F(2)$

19) If $f(x) = g(x)+7$ for $3 \le x \le 5$ then $\int_{3}^{5} [f(x) + g(x)].dx =$

A) $2\int_{3}^{5} g(x).dx + 7$ B) $2\int_{3}^{5} g(x).dx + 14$ C) $2\int_{3}^{5} g(x).dx + 28$ D) $\int_{3}^{5} g(x).dx + 14$

20) If $\int_{1}^{x+2} f(t).dt = \ln x - \frac{1}{x}$ for all values of $x > 1$ then $f(3) =$

A) $\frac{4}{9}$ B) $\frac{2}{9}$ C) 2 D) 0

21) If $x > 0$ then $\int \left(\frac{1}{x} \int_{1}^{x} \frac{dt}{t} \right) .dx$ equals:

A) $\frac{\ln x}{x} + c$ B) $\frac{1}{x} + c$ C) $\frac{(\ln x)^2}{x} + c$ D) $\frac{(\ln x)^2}{2} + c$

22) If $\int_{1}^{x} f(t).dt = e^{e^x} + 2$ then $f(x)$ is:

A) e^{e^x} B) e^{x+e^x} C) e^x D) e^{xe^x}

23) $\frac{d}{dx}\left(\int_{2}^{\tan x} \frac{1}{t^2+1}.dt \right) =$

A) 1 B) $\frac{1}{\tan^2 x + 1}$ C) $\cos x$ D) $\sec^2 x$

24) If $\int \frac{\ln(\ln x)}{x\ln x}.dx = \int u.du$ then the substitution used is:

A) $u = x\ln x$ B) $u = \ln(\ln x)$ C) $u = \ln x$ D) $u = \frac{\ln x}{x}$

25) If $f(x) = \ln\left(\int_1^x \frac{1}{t}.dt\right)$ then $f'(x)$ is:

A) $\frac{\ln x}{x}$ B) $\frac{1}{x}$ C) $x\ln x$ D) $\frac{1}{x\ln x}$

26) Let $f(x)$ be a continuous function on $[0,2]$ where $2 \le f(x) \le 4$ then the maximum value for $\int_0^2 f(x).dx$ is:

A) 0 B) 2 C) 4 D) 8

27) Find $\int \frac{x^2}{e^{x^3}}.dx$

A) $\frac{-1}{3}\ln(e^{x^3}) + c$ B) $\frac{-e^{x^3}}{3} + c$ C) $\frac{-1}{3e^{x^3}} + c$ D) $\frac{x^3}{3e^{x^3}} + c$

28) Evaluate $\int_{-1}^{2} \frac{|x|}{x}.dx$

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

29) If $\int_1^4 f(x).dx = 6$ then $\int_1^4 f(5-x).dx$ is:

A) 6 B) -6 C) 3 D) -3

30) If the interval $[0,1]$ is partitioned into n subintervals with $\Delta x = \frac{1}{n}$ and $c_k \in [x_{k-1}, x_k]$ then $\lim_{n\to\infty}\left(\frac{1}{n}\sum_{k=1}^{n}\sqrt{\frac{c_k}{50}}\right)$ is:

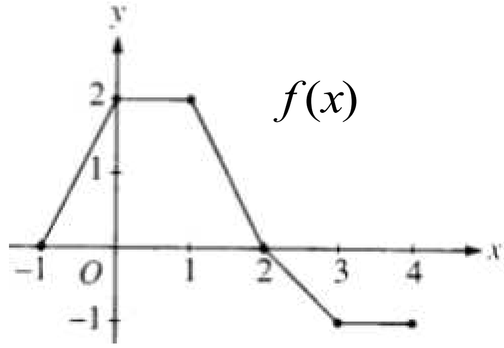
A) $\int_0^1 \sqrt{x}.dx$ B) $\int_0^1 \sqrt{\frac{x}{50}}.dx$ C) $\frac{1}{50}\int_0^1 \sqrt{x}.dx$ D) $\frac{1}{50}\int_0^1 \sqrt{\frac{x}{50}}.dx$

31) $\int_0^x \sin t.dt =$

A) $\sin x$ B) $-\cos x$ C) $\cos x$ D) $1-\cos x$

32) The graph of a piecewise-linear function f, for $-1 \le x \le 4$ is shown below

What is the value of $\int_{-1}^{4} f(x).dx$



A) 1 B) 2.5 C) 4 D) 2.5

33) The closed interval $[a,b]$ is partitioned into n equal subintervals, each of width

Δx ,by the numbers $x_o, x_1, x_2, ..., x_n$ where $a = x_o < x_1 < x_2 < ... < x_n = b$

what is $\lim_{n\to\infty} \sum_{i=1}^{n} \sqrt{x_i}\Delta x$?

A) $\frac{2}{3}(b^{\frac{3}{2}} - a^{\frac{3}{2}})$ B) $b^{\frac{3}{2}} - a^{\frac{3}{2}}$ C) $\frac{3}{2}(b^{\frac{3}{2}} - a^{\frac{3}{2}})$ D) $b^{\frac{1}{2}} - a^{\frac{1}{2}}$

34) If $0 \le x \le 4$, of the following , which is the greatest value of x such that

$\int_0^x (t^2 - 2t).dt \ge \int_2^x t.dt$?

A) 1.35 B) 1.38 C) 1.41 D) 1.48

35*) Let $f(x) = \int_0^{x^2} \sin t.dt$ .At how many points in the closed interval $[0, \sqrt{\pi}]$ does the instantaneous rate of change of f equals the average rate of change of f on the interval?

A) zero B) One C) Two D) Three

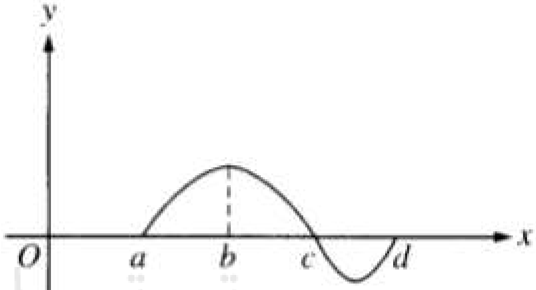
36) $\int_0^1 \sqrt{x}(x+1).dx =$

A) 0 B) 1 C) $\frac{16}{15}$ D) $\frac{7}{5}$

37*) If $\int_{-1}^{1} e^{-x^2}.dx = k$, then $\int_{-1}^{0} e^{-x^2}.dx =$

A) $-2k$ B) $-k$ C) $\frac{k}{2}$ D) $2k$

38) The graph of f is shown in the figure below. If $g(x) = \int_{a}^{x} f(t).dt$ for what value value of x does $g(x)$ have a maximum?



A) a B) b C) c D) d

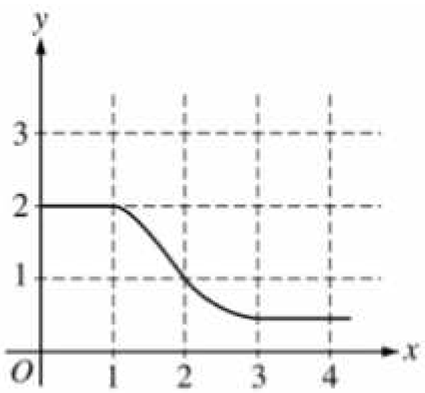
39) If $\int_{a}^{b} f(x).dx = a + 2b$ then $\int_{a}^{b} (f(x)+5).dx =$

A) $a+2b+5$ B) $5b-5a$ C) $7b-4a$ D) $7b-5a$

40) $\int_{0}^{\pi/4} \frac{e^{\tan x}}{\cos^2 x}.dx =$

A) 0 B) e C) 1 D) $e-1$

41) The graph of f is shown in the figure below. If $\int_{1}^{3} f(x).dx = 2.3$ and $F'(x) = f(x)$, then $F(3) - F(0) =$



A) 0.3 B) 1.3 C) 4.3 D) 3.3

42) Which of the following is equal to $\int_0^{\pi} \sin x.dx$

A) $\int_{-\pi/2}^{\pi/2} \cos x.dx$ B) $\int_0^{\pi} \cos x.dx$ C) $\int_{-\pi}^{0} \sin x.dx$ D) $\int_{\pi}^{2\pi} \sin x.dx$

43) If $f(x)=\begin{cases} x & ,x\le 1 \\ \frac{1}{x} & ,x>1 \end{cases}$ then $\int_0^{e} f(x).dx=$

A) 0 B) $\frac{3}{2}$ C) 2 D) e

44) Let $f(x) = \int_{-2}^{x^2-3x} e^{t^2}.dx$. At what value of x is $f(x)$ a minimum?

A) $\frac{1}{2}$ B) $\frac{3}{2}$ C) 2 D) 3

45) $\int_1^{2} (4x^3-6x).dx =$

A) 2 B) 4 C) 6 D) 36

46) $\frac{d}{dx}\left(\int_0^{x} \cos 2\pi u.du\right)$ is

A) 0 B) $\frac{1}{2\pi}\sin x$ C) $\frac{1}{2\pi}\cos 2\pi x$ D) $\cos 2\pi x$

47) If p is a polynomial of degree n , $n > 0$, what is the degree of the polynomial

$Q(x) = \int_0^{x} p(t).dt$?

A) 1 B) $n+1$ C) $n-1$ D) n

48) $\int_0^{1} x^3 e^{x^4}.dx =$

A) $\frac{1}{4}(e-1)$ B) $\frac{1}{4}e$ C) $e-1$ D) e

49) $\int_{0}^{2} \sqrt{4-x^2}.dx =$

A) $\frac{8}{3}$ B) $\frac{16}{3}$ C) π D) 2π

50) If $\int_{1}^{4} f(x).dx = 6$ what is the value of $\int_{1}^{4} f(5-x).dx$?

A) 6 B) -6 C) 3 D) -1

51) If $\int_{1}^{10} f(x).dx = 4$ and $\int_{10}^{3} f(x).dx = 7$ then $\int_{1}^{3} f(x).dx =$

A) 3 B) -3 C) 10 D) 11

52) $\int_{0}^{1} x(x^2+2)^2.dx =$

A) $\frac{19}{2}$ B) $\frac{19}{3}$ C) $\frac{9}{2}$ D) $\frac{19}{6}$

53) If $F(x) = \int_{1}^{x^2} \sqrt{1+t^3}.dt$ then $F'(x) =$

A) $2x\sqrt{1+x^6}$ B) $2x\sqrt{1+x^3}$ C) $\sqrt{1+x^6}$ D) $\sqrt{1+x^3}$

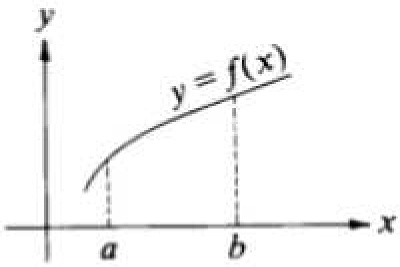
54) $\int_{1}^{4} |x-3|.dx =$

A) $\frac{-3}{2}$ B) $\frac{3}{2}$ C) $\frac{5}{2}$ D) $\frac{9}{2}$

55) If the substitution $u = \frac{x}{2}$,is made the integral $\int_{2}^{4} \frac{1-(\frac{x}{2})^2}{x}.dx =$

A) $\int_{1}^{2} \frac{1-u^2}{u}.du$ B) $\int_{2}^{4} \frac{1-u^2}{u}.du$ C) $\int_{1}^{2} \frac{1-u^2}{2u}.du$ D) $\int_{2}^{4} \frac{1-u^2}{2u}.du$

56) If f is a continuous function and strictly increasing on the interval $a \le x \le b$ as shown below, which of the following must be true?



I. $\int_a^b f(x).dx \le f(b)(b-a)$

II. $\int_a^b f(x).dx \ge f(a)(b-a)$

III. $\int_a^b f(x).dx = f(c)(b-a)$ for some number c such that $a < c < b$

A) I only B) II only C) III only D) I, II and III

57) Let f be a continuous function on the closed interval [0,2]. If $2 \le f(x) \le 4$, the greatest possible value of $\int_0^2 f(x).dx$ is:

A) 2 B) 4 C) 8 D) 16

58) $\int_1^2 \frac{x+1}{x^2+2x}.dx =$

A) $\ln 8 - \ln 3$ B) $\frac{\ln 8 - \ln 3}{2}$ C) $\ln 8$ D) $\frac{3\ln 2}{2}$

59) $\lim_{h \to 0} \frac{\int_1^{1+h} \sqrt{x^5+8}.dx}{h} =$

A) 0 B) 1 C) 3 D) Doesnot exist

60) If $\int_{-2}^{2} (x^7+k).dx = 16$, then $k =$

A) -12 B) -4 C) 0 D) 4

61) $\int_1^2 \frac{x^2-1}{x+1}.dx =$

A) $\frac{1}{2}$ B) 1 C) 2 D) $\frac{5}{2}$

62) $\int_{0}^{3} |x-1|.dx =$

A) $\frac{3}{2}$ B) 2 C) $\frac{5}{2}$ D) 6

63) $\int_{0}^{\pi/3} \sin(3x).dx =$

A) -2 B) $\frac{-2}{3}$ C) 0 D) $\frac{2}{3}$

64) If $\int_{1}^{2} f(x-c).dx = 5$ where c is a constant, then $\int_{1-c}^{2-c} f(x).dx =$

A) $5+c$ B) 5 C) $5-c$ D) -5

65) $\int_{0}^{3} (x+1)^{1/2}.dx =$

A) $\frac{21}{2}$ B) 7 C) $\frac{16}{3}$ D) $\frac{14}{3}$

66) $\int_{-1}^{2} \frac{|x|}{x}.dx =$

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

67) If n is a known positive integer, for what value of k is $\int_{1}^{k} x^{n-1}.dx = \frac{1}{n}$

A) 0 B) $\left(\frac{2}{n}\right)^{1/n}$ C) 2^{n} D) $2^{1/n}$

68) $\int_{0}^{1} (x+1)e^{x^2+2x}.dx =$

A) $\frac{e^3}{2}$ B) $\frac{e^3-1}{2}$ C) $\frac{e^4-e}{2}$ D) e^3-1

69) $\int_{0}^{\pi/4} \tan^2 x.dx =$

A) $\frac{\pi}{4}-1$ B) $1-\frac{\pi}{4}$ C) $\frac{\pi}{4}+1$ D) $\frac{1}{3}$

70) $\int_{0}^{1/2} \frac{2x}{\sqrt{1-x^2}}.dx =$

A) $1-\frac{\sqrt{3}}{2}$ B) $\frac{1}{2}\ln\frac{3}{4}$ C) $\frac{\pi}{6}$ D) $2-\sqrt{3}$

71) $\int_{1}^{2} \frac{x-4}{x^2}.dx =$

A) $-\frac{1}{2}$ B) $\ln 2-2$ C) $\ln 2$ D) $\ln 2$

72) If n is a non-negative integer, then $\int_{0}^{1} x^n.dx = \int_{0}^{1} (1-x)^n.dx$ for:

A) No n B) n even only C) n odd only D) All n

73) $\int_{0}^{8} \frac{dx}{\sqrt{x+1}} =$

A) 1 B) $\frac{3}{2}$ C) 2 D) 4

74) $\int_{0}^{1} \sqrt{x^2-2x+1}.dx$

A) -1 B) $\frac{-1}{2}$ C) $\frac{1}{2}$ D) 1

75) $\int_{\pi/4}^{\pi/2} \frac{\cos x}{\sin x}.dx =$

A) $\ln\sqrt{2}$ B) $\ln\frac{\pi}{4}$ C) $\ln\sqrt{3}$ D) $\ln\frac{\sqrt{3}}{2}$

76) If $f(x)=\begin{cases} x^2+2 & ,0\le x\le 2 \\ 8-x & ,\text{Otherwise} \end{cases}$, then $\int_{0}^{7} f(x).dx$ is a number between:

A) 0 and 10 B) 10 and 20 C) 20 and 30 D) 30 and 40

77) $\int_0^2 \sqrt{x^2-4x+4}\,.dx$

A) 1 B) -1 C) -2 D) 2

78) If $\int_2^4 f(x).dx = 6$, then $\int_2^4 (f(x)+3).dx =$

A) 12 B) 9 C) 6 D) 3

79*) Given $5x^3 + 40 = \int_a^x f(t).dt$ .The value of a is:

A) -2 B) 2 C) -1 D) 1

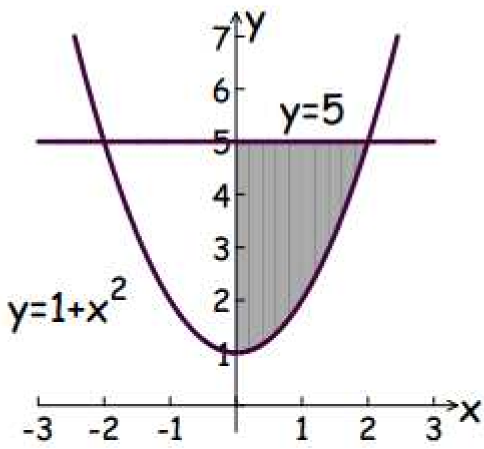
80) For what value of k , $k>0$, does $\int_0^k (4kx-5k).dx = k^2$?

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

81) If $0<k<\pi$ then $\int_0^k \cos(2x).dx = \frac{1}{2}$ when $k=$

A) $\frac{\pi}{4}$ B) $\frac{\pi}{2}$ C) $\frac{\pi}{12}$ D) $\frac{3\pi}{4}$

82) Which of the following integrals correctly corresponds to the area of the shaded region in the figure to the right ?



A) $\int_0^2 (x^2-4).dx$

B) $\int_0^2 (4-x^2).dx$

C) $\int_0^5 (x^2-4).dx$

D) $\int_0^5 (4-x^2).dx$

83) $\dfrac{d}{dx}\left(\int_{-2}^{\sqrt{x}} t^2\sqrt{4-t^2}\,.dt\right) =$

A) $t\sqrt{4-t}$ B) $x\sqrt{4-x}$ C) $\dfrac{1}{2}\sqrt{x}\sqrt{4-x}$ D) $x\sqrt{4-x^2}$

84) If $\int_{30}^{100} f(x).dx = A$ and $\int_{50}^{100} f(x).dx = B$ then $\int_{30}^{50} f(x).dx =$

A) $A+B$ B) $A-B$ C) 0 D) $B-A$

85) The average value of the function $f(x) = (x-1)^2$ on the interval from $x = 1$ to $x = 5$ is:

A) $\dfrac{-16}{3}$ B) $\dfrac{16}{3}$ C) $\dfrac{64}{3}$ D) $\dfrac{66}{3}$

86*) The average value of the function $f(x) = (\ln x)^2$ on the interval [2,4] is:

A) -1.204 B) 1.204 C) 2.159 D) 2.408

87) $\int x\sqrt{3x}\,.dx =$

A) $\dfrac{2\sqrt{3}}{5}x^{5/2}+c$ B) $\dfrac{5\sqrt{3}}{2}x^{5/2}+c$ C) $\dfrac{5\sqrt{3}}{2}x^{1/2}+c$ D) $2\sqrt{3x}+c$

88) Find the distance traveled (to three decimal places) in the first four seconds, for a particle whose velocity is given by $v(t)=7e^{-t^2}$, where t stands for time.

A) 6.204 B) 3.5 C) 0.976 D) 5.4

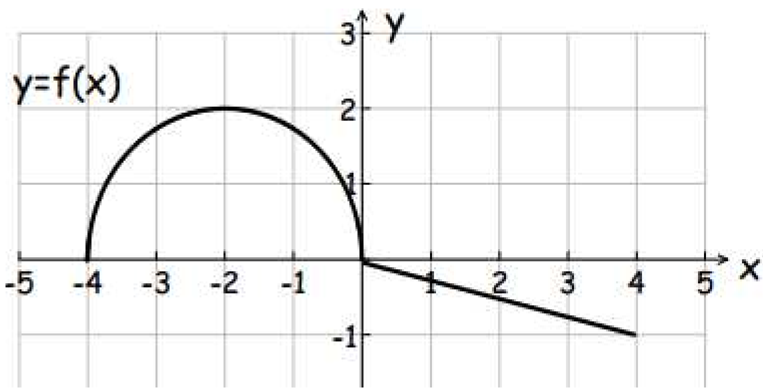
89) The graph of the function f shown below consists of a semicircle and a straight line segment. Then $\int_{-4}^{4} f(x).dx =$

A) $2\pi+1$

B) $2(\pi-1)$

C) $\pi+2$

D) $2(2\pi+1)$



90) $\frac{d}{dx}\left(\int_{2x}^{5x}\sqrt{2-\cos t}\,.dt\right) =$

A) $2\sqrt{2-\cos 5x}-5\sqrt{2-\cos 2x}$

B) $5\sqrt{2-\cos 2x}-2\sqrt{2-\cos 5x}$

C) $2\sqrt{2-\cos 2x}-5\sqrt{2-\cos 5x}$

D) $5\sqrt{2-\cos 5x}-2\sqrt{2-\cos 2x}$

91) Given that the function f is continuous on the interval $[1,\infty)$, and that

$\int_{1}^{x} f(t).dt = \sqrt{x}$ then $\int_{1}^{x} f^2(t).dt =$

A) x B) $x/4$ C) $\frac{1}{4}\ln x$ D) $\frac{1}{4}(\ln x-1)$

92) Given that the function f is continuous on the interval $[1,\infty)$, and that

$\int_{1}^{x} \sqrt{f(t)}.dt = \sqrt{x}$ then $\int_{1}^{\infty} f^2(t).dt =$

A) 0 B) $\frac{1}{16}$ C) $\frac{1}{4}$ D) ∞

93) Suppose you know that $\int_{0}^{3} f(x).dx = 12$ and the average value of $f(x)$ on $[3,5]$

is -6 . Find $\int_{0}^{5} f(x).dx$

A) 0 B) 2 C) 3 D) 6

94) Find the average value of $f(x)=\sin x.e^{1-\cos x}$ on the interval $[0,\pi]$

A) e^2-e^{-1} B) $\frac{1-e^2}{\pi}$ C) $\frac{e^2-1}{\pi}$ D) $\frac{1-e^2}{2\pi}$

95) A curve has a slope of - x + 2 at each point (x, y) on the curve. Which of the following is an equation for this curve if it passes through the point (2,1)?

A) $\frac{1}{2}x^2-2x-4$ B) $2x^2+x-8$ C) $\frac{-1}{2}x^2+2x-1$ D) x^2-2x+1

96) Using a left Riemann sum with three subintervals [0,1] , [1, 2] , and [2,3] , what is the approximation of $\int_0^3 (3-x)(x+1).dx$?

A) 7.5 B) 9 C) 10 D) 11.5

97) The function f is continuous on the closed interval [1,10] and has values as shown in the table below. Using a right Riemann sum with four subintervals [1,3] , [3,5] , [5,8] , [8,10] ,what is the approximation of $\int_1^{10} f(x).dx$

x	1	3	5	8	10
$f(x)$	7	12	16	23	17

A) 96 B) 116 C) 132 D) 159

97) The expression $\frac{1}{20}\left[\left(\frac{1}{20}\right)^2+\left(\frac{2}{20}\right)^2+\left(\frac{3}{20}\right)^2+...+\left(\frac{20}{20}\right)^2\right]$ is a Riemann sum approximation for :

A) $\frac{1}{20}\int_0^{20} x^2.dx$ B) $\frac{1}{20}\int_0^{1} x^2.dx$ C) $\int_0^{1} x^2.dx$ D) $\int_0^{1} \frac{1}{x^2}.dx$

98) Using a left Riemann sum with three subintervals [0,1] , [1, 2] , and [2,3] , what is the approximation of $\int_0^3 \sqrt{1+x^2}.dx$?

A) 5.613 B) 6.213 C) 6.812 D) 7.195

99) The expression $\frac{1}{30}\left[\sqrt{\frac{1}{30}}+\sqrt{\frac{2}{30}}+\sqrt{\frac{3}{30}}+...+\sqrt{\frac{30}{30}}\right]$ is a Riemann sum approximation for :

A) $\int_0^1 \sqrt{x}.dx$ B) $\frac{1}{30}\int_0^1 \sqrt{x}.dx$ C) $\frac{1}{30}\int_0^{30} \sqrt{x}.dx$ D) $\int_0^1 \frac{1}{\sqrt{x}}.dx$

100) The expression $\frac{1}{10}\left[\frac{1}{10}+\frac{2}{10}+\frac{3}{10}+...+\frac{20}{10}\right]$ is a Riemann sum approximation for:

A) $\int_0^2 2.dx$ B) $\int_0^2 x.dx$ C) $\int_0^2 \frac{x}{10}.dx$ D) $\frac{1}{10}\int_0^1 x.dx$

101) The area of the region in the first quadrant enclosed by the graph of $f(x)=4x-x^3$ and the x-axis is:

A) $\frac{11}{4}$ B) $\frac{7}{2}$ C) 4 D) $\frac{11}{2}$

102) Which of the following limits is equal to $\int_1^3 x^3 .dx$?

A) $\lim_{n\to\infty}\sum_{i=1}^{n}(1+\frac{i}{n})^3\frac{1}{n}$ B) $\lim_{n\to\infty}\sum_{i=1}^{n}(1+\frac{i}{n})^3\frac{2}{n}$ C) $\lim_{n\to\infty}\sum_{i=1}^{n}(1+\frac{2i}{n})^3\frac{1}{n}$ D) $\lim_{n\to\infty}\sum_{i=1}^{n}(1+\frac{2i}{n})^3\frac{2}{n}$

103) Which of the following integrals is equal to $\lim_{n\to\infty}\sum_{i=1}^{n}(-1+\frac{3i}{n})^2\frac{3}{n}$?

A) $\int_{-1}^{2} x^2 .dx$ B) $\int_{-1}^{0} x^2 .dx$ C) $\int_{-1}^{2} (-1+x)^2 .dx$ D) $\int_{-1}^{0} (-1+\frac{x}{3})^2 .dx$

104) The closed interval $[a , b]$ is partitioned into n equal subintervals, each of width Δx , by the numbers $x_\circ , x_1 , x_2 ,\dots, x_n$ where $a < a = x_\circ < x_1 < x_2 < \dots < x_n = b$. What is $\lim_{n\to\infty}\sum_{i=1}^{n}\frac{1}{\sqrt{x_i}}\Delta x$?

A) $\frac{1}{\sqrt{b}}-\frac{1}{\sqrt{a}}$ B) $\frac{(\sqrt{b}-\sqrt{a})}{2}$ C) $2(\sqrt{b}-\sqrt{a})$ D) $\sqrt{b}-\sqrt{a}$

105) If n is a positive integer, then $\lim_{n\to\infty}\frac{1}{n}\left[\left(\frac{1}{n}\right)^2+\left(\frac{2}{n}\right)^2+\dots+\left(\frac{n}{n}\right)^2\right]$ can be expressed as:

A) $\int_0^1 \frac{1}{x}.dx$ B) $\int_0^1 \frac{1}{x^2}.dx$ C) $\int_0^1 x^2 .dx$ D) $\frac{1}{2}\int_0^1 x^2 .dx$

106) If n is a positive integer, then $\lim_{n\to\infty}\frac{2}{n}\left[\sqrt{\frac{2}{n}}+\sqrt{\frac{4}{n}}+\dots+\sqrt{\frac{2n}{n}}\right]$ can be expressed as:

A) $\int_0^1 \sqrt{x}.dx$ B) $\int_0^2 \sqrt{x}.dx$ C) $\int_0^1 \frac{1}{\sqrt{x}}.dx$ D) $\int_0^2 \frac{1}{\sqrt{x}}.dx$

107) If $\int_a^b f(x)\,dx = 2a-5b$, then $\int_a^b [f(x)-2]\,dx =$

(A) $-7b$ (B) $-3b$ (C) $4a-7b$ (D) $4a-3b$

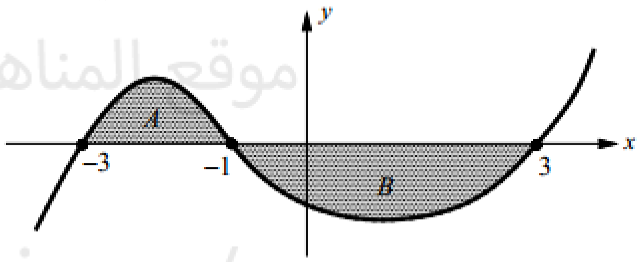
108) If $\int_1^6 f(x)\,dx = \frac{15}{2}$ and $\int_6^4 f(x)\,dx = 5$, then $\int_1^4 f(x)\,dx =$

(A) $\frac{5}{2}$ (B) $\frac{9}{2}$ (C) $\frac{19}{2}$ (D) $\frac{25}{2}$

109) If $\int_{-2}^6 f(x)\,dx = 10$ and $\int_2^6 f(x)\,dx = 3$, then $\int_2^6 f(4-x)\,dx =$

(A) 3 (B) 6 (C) 7 (D) 10

110) The graph of $y = f(x)$ is shown in the figure below. If A and B are positive numbers that represent the areas of the shaded regions, what is the value of $\int_{-3}^3 f(x)\,dx - 2\int_{-1}^3 f(x)\,dx$ in terms of A and B ?



A) $-A-B$ B) $A+B$ C) $A-2B$ D) $A-B$

111) For $-\frac{\pi}{2} < x < \frac{\pi}{2}$, if $F(x) = \int_0^{\sin x} \frac{dt}{\sqrt{1-t^2}}$, then $F'(x) =$

A) $\frac{\sin x}{\sqrt{1-x^2}}$ B) $\frac{\cos x}{\sqrt{1-x^2}}$ C) 1 D) $\csc x$

112) If $F(x) = \int_0^{\sqrt{x}} \cos(t^2)\,dt$, then $F'(4) =$

A) $\cos 2$ B) $\frac{\cos 4}{4}$ C) $\frac{\cos 4}{\sqrt{2}}$ D) $\sqrt{2}\cos 4$

113) If $F(x) = \int_0^{x^2} \frac{\sqrt{t^2+3}}{2t}\,dt$, then $F''(1) =$

A) -1 B) 0 C) 1 D) $\frac{3}{2}$

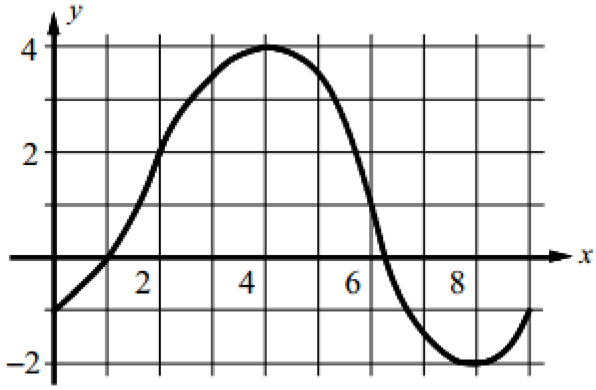
114) The graph of the function g , shown in the figure below, has horizontal tangents at $x = 4$ and $x = 8$. If $f(x) = \int_0^{\sqrt{x}} g(t)\,dt$, what is the value of $f'(4)$?

A) 0

C) $\frac{3}{4}$

B) $\frac{1}{2}$

D) $\frac{3}{2}$



115) If f is the antiderivative of $\frac{\sqrt{x}}{1+x^3}$ such that $f(1) = 2$, then $f(3) =$

A) 1.845 B) 2.397 C) 2.906 D) 3.234

116) If f is a continuous function and $F'(x) = f(x)$ for all real numbers x , then $\int_2^{10} f(\frac{1}{2}x)\,dx =$

A) $\frac{1}{2}[F(5) - F(1)]$

C) $2[F(5) - F(1)]$

B) $\frac{1}{2}[F(10) - F(2)]$

D) $2[F(10) - F(2)]$

117) If the substitution $u = 2 - x$ is made, $\int_1^3 x\sqrt{2-x}\,dx =$

A) $\int_{-1}^{1} u\sqrt{u}\,du$

C) $\int_1^3 (2-u)\sqrt{u}\,du$

B) $-\int_1^3 u\sqrt{u}\,du$

D) $\int_{-1}^{1} (u-2)\sqrt{u}\,du$

118) If $\int_{-1}^{3} f(x+k)\,dx = 8$, where k is a constant, then $\int_{k-1}^{k+3} f(x)\,dx =$

A) $8 - k$ B) $8 + k$ C) 8 D) $k - 8$

119) If $\int_0^6 f(x)\,dx = 12$, what is the value of $\int_0^6 f(6-x)\,dx$?

A) 12　B) 6　C) 0　D) –6

120) If the substitution $u = 1+\sqrt{x}$ is made, $\int \frac{(1+\sqrt{x})^{3/2}}{\sqrt{x}}\,dx =$

A) $\frac{1}{2}\int u^{3/2}\,du$　B) $2\int u^{3/2}\,du$　C) $\frac{1}{2}\int \sqrt{u}\,du$　D) $2\int \sqrt{u}\,du$

121) If the substitution $u = \ln x$ is made, $\int_e^{e^2} \frac{1-(\ln x)^2}{x}\,dx =$

A) $\int_e^{e^2} (\frac{1}{u}-u^2)\,du$　C) $\int_1^2 (1-u^2)\,du$

B) $\int_e^{e^2} (\frac{1}{u}-u)\,du$　D) $\int_1^2 (1-u)\,du$

122) $\int_0^1 \frac{x}{e^{x^2}}\,dx =$

A) $e-1$　B) $(1-\frac{1}{e})$　C) $\frac{1}{2}(1-\frac{1}{e})$　D) $\frac{1}{2}(1-\frac{1}{e^2})$

123) Let $F(x)$ be an antiderivetive of $\ln(\sin^2 x)+3$. If $F(1)=2$, then $F(3)=$

A) 6.595　B) 7.635　C) 10.036　D) 12.446

124) $\int_1^e \frac{\cos(\ln x)}{x}\,dx =$

A) $\frac{1}{\sin 1}$　B) $\frac{1}{\cos 1}$　C) $\sin(e)$　D) $\sin 1$

125) $\int_0^2 \frac{x^2}{x+1}\,dx =$

A) $\ln 3$　B) $\ln 3+2$　C) $\ln 6$　D) $\ln 6+4$

126) Evaluate the sum $\sum_{k=1}^{14} k$

A) 14 B) 105 C) 210 D) $\frac{105}{2}$

127) Evaluate the sum $\sum_{k=1}^{7} k^2 - 7$

A) 91 B) 140 C) 133 D) 42

128) Evaluate $\sum_{k=1}^{8} k^3$

A) 204 B) 512 C) 648 D) 42

129) Suppose that f and g are continuous and that $\int_6^{10} f(x).dx = -3$ and $\int_6^{10} g(x).dx = 9$

find $\int_6^{10} [4f(x)+g(x)].dx$

A) -3 B) 33 C) 13 D) 24

130) Suppose that g is continuous and that $\int_4^{7} g(x).dx = 10$ and $\int_4^{10} g(x).dx = 13$

Find $\int_{10}^{7} g(x).dx$

A) 23 B) -3 C) -23 D) 3

131) Suppose that f is continuous and that $\int_{-4}^{4} f(z).dz = 0$ and $\int_{-4}^{7} f(z).dz = 4$

Find $-\int_4^{7} 6f(x).dx$

A) 24 B) -6 C) -4 D) -24

132) $\int_1^{2} |x^2 - 3x + 2|.dx =$

A) $\frac{1}{6}$ B) $\frac{-1}{6}$ C) $\frac{1}{3}$ D) $\frac{2}{3}$

133*) $\int_0^{\pi/2} \frac{\sqrt{\cot x}}{\sqrt{\cot x}+\sqrt{\tan x}}.dx =$

A) 0 B) $\frac{\pi}{2}$ C) $\frac{\pi}{4}$ D) None of these

134*) $\int_0^{\pi/2} \frac{(\sin x+\cos x)^2}{\sqrt{1+2\sin x\cos x}}.dx =$

A) 0 B) 1 C) 2 D) 3

135*) $\int_2^{8} \frac{\sqrt[3]{x+1}}{\sqrt[3]{x+1}+\sqrt[3]{11-x}}.dx =$

A) 6 B) 4 C) 3 D) 2

136) Evaluate $\sum_{i=6}^{30} 7i$

A) 3255 B) 3150 C) 3108 D) 3185

137) $\sum_{k=1}^{3}(k+k^2) \quad =$

A) 10 B) 20 C) 30 D) 40

138) Which of the following is equal to $1-4+16-64+256$

A) $\sum_{k=1}^{5} (-4)^k$

B) $\sum_{k=-1}^{3} (-1)^{k+1} 4^k$

C) $\sum_{k=0}^{4} (-1)^k 4^k$

D) $\sum_{k=-2}^{2} (-1)^{k+1} 4^{k+1}$