

Integration Test Convention 2001

FAMAT State

***For all questions, answer E "NOTA" means none the above answers is correct.

1. Suppose that $f(x)$ is an even function and let $\int_0^1 f(x)dx = 5$ and $\int_0^7 f(x)dx = 1$.

What is $\int_{-7}^{-1} f(x)dx$?

a) -5

b) -4

c) 0

d) 4

e)

NOTA

2. If $\int_0^6 (x^2 - 2x + 2)dx$ is approximated by 3 inscribed rectangles of equal width on the x-axis, then the approximation is

a) 24

b) 26

c) 28

d) 48

e) NOIA

3. Let $R(t)$ represent the rate at which water is leaking out of a tank, where t is measured in hours. Which of the following expressions represents the total amount of water that leaks out in the first 3 hours?

a) $R(3) - R(0)$

b) $\frac{R(3) - R(0)}{3}$

c) $\int_0^3 R(t)dt$

d) $\int_0^3 R'(t)dt$

e) NOTA

4. If n is a positive integer, then $\lim_{n \rightarrow \infty} \frac{1}{n} \left[\frac{1}{1+(1/n)} + \frac{1}{1+(2/n)} + \dots + \frac{1}{1+(n/n)} \right]$ can be expressed as

a) $\int_0^1 \frac{1}{x} dx$

b) $\int_1^2 \frac{1}{x+1} dx$

c) $\int_1^2 x dx$

d) $\int_1^2 \frac{2}{x+1} dx$

e)

NOTA

5. If f and g are continuously differentiable functions for all real numbers, which of the following definite integrals is equal to $f(g(4)) - f(g(2))$?

- a) $\int_2^4 f'(g(x))dx$ b) $\int_2^4 f(g(x))f'(x)dx$ c) $\int_2^4 f(g(x))g'(x)dx$ d) $\int_2^4 f'(g(x))g'(x)dx$
 e) NOTA

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6. In the interval, $0 \leq x \leq 5$, the graphs of $y = \cos 2x$ and $y = \sin 3x$ intersect four times. Let A, B, C, D be the x -coordinates of these points so that $0 < A < B < C < D < 5$. Which of the definite integrals below represents the largest number?

- a) $\int_0^A (\cos 2x - \sin 3x)dx$ b) $\int_A^B (\sin 3x - \cos 2x)dx$ c) $\int_B^C (\sin 3x - \cos 2x)dx$
 d) $\int_C^D (\cos 2x - \sin 3x)dx$ e) NOTA

7. Find $F'(1)$ if $F(x) = \int_x^1 \frac{2}{1+t} dt$.

- a) $\frac{2}{3}$ b) -2 c) -1 d) 0
 e) NOTA

8. If $\int_{-c}^1 g(x+c)dx = 10$ for a constant c , then $\int_{1+c}^0 g(x)dx = ?$

- a) 10 b) $10 - c$ c) -10 d) $c - 10$
 e) NOTA

9. $\int_0^6 |x-2| dx =$

- a) 6 b) 10 c) 14 d) $\frac{11}{2}$
 e) NOTA

10. If, for $k \geq 0$, $\int_1^k \frac{x+1}{x} dx = k+1$, then $k = ?$

- a) 1 b) e^e c) $\ln 3$ d) e^2 e)
 NOTA

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11. The average circumference of all circles with radii between 1 cm and 3 cm is closest to

- a) $2p$ b) $4p$ c) $6p$ d) $8p$
 e) NOTA

12. $\int_{\ln 3}^{\ln 4} e^x (e^x - 4)^2 dx =$

- a) $\frac{1}{3}$ b) $\frac{1}{27}$ c) $\ln 64$ d) $\ln \frac{4}{3}$
 e) NOTA

13. If $\frac{1}{6t} \frac{dx}{dt} = x\sqrt{3t^2-1}$, then $x(t) =$

- a) $e^{\left(\frac{2\sqrt{(3t^2-1)^3}}{3}\right)} + c$ b) $Ce^{\left(\frac{2\sqrt{(3t^2-1)^3}}{3}\right)}$ c) $e^{\left(\frac{2(3t^2-1)^3}{3} + c\right)}$ d) $\frac{2}{3}(3t^2-1)^{\frac{2}{3}} + c$ e)

NOTA

14. If $f(x) = x$ and $g(x) = e^{\cos x}$, then $\int_{-2}^2 \frac{f(x)}{g(x)} dx =$

- a) $2 \int_{-2}^2 \frac{f(x)}{g(x)} dx$ b) 0 c) $2e^{\cos 2}$ d) $\frac{1}{2}e^{\cos 2}$ e) NOTA

15. A particle is initially at rest and accelerates as $a(t) = \sin 2t$. Its velocity $v(t)$ is

- a) $\sin 2t + \frac{1}{2}$ b) $\frac{-1}{2} \cos 2t - \frac{1}{2}$ c) $-\cos 2t$ d) $\frac{-1}{2} \cos 2t + \frac{1}{2}$ e) NOTA

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16. If $f(x) = \int_1^{x^2} e^{t^2} dt$, then $f''(0) =$

- a) 0 b) 1 c) 2 d) 3 e) NOTA

17. For the Trapezoidal Rule with $n = 4$, $\int_0^7 (x^2 - 7x) dx \approx$

- a) -55.011 b) -53.594 c) -57.167 d) -
60.743 e) NOTA

18. The average value of $g(x) = \cos x \sqrt{\sin x + 3}$ on the interval $\left[0, \frac{p}{2}\right]$ is

- a) $\frac{2}{p}$ b) $\frac{p}{4}$ c) $\frac{2}{3}(8 - 3\sqrt{3})$ d) $\frac{4}{3p}(8 - 3\sqrt{3})$ e) NOTA

19. $\int_P^{\frac{5P}{4}} \tan x dx + \int_{-P}^P \cos x dx$

- a) $-\ln\sqrt{2}$ b) $\ln 2 + \ln\sqrt{2}$ c) 1 d) $\ln 2 - \ln\sqrt{2}$
 e) NOTA

20. $\int_1^2 (5x - 3)^2 dx =$

- a) 45 b) $\frac{67}{3}$ c) $\frac{335}{3}$ d) 335
 e) NOTA

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21. What is the area under the curve xe^{x^2} between $x = 0$ and $x = 2$?

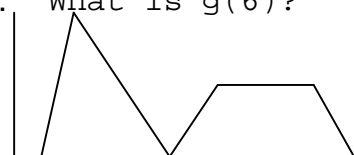
- a) $\frac{e^4}{2} - \frac{1}{2}$ b) $\frac{e^4}{2}$ c) $e^4 - 1$ d) $4e^4$
 e) NOTA

22. Which of the following improper integrals diverge?

- a) $\int_0^{\frac{P}{2}} \frac{\sin x}{1 - \cos x} dx$ b) $\int_0^1 \frac{1}{\sqrt{1-x}} dx$ c) $\int_4^{\infty} xe^{-x^2} dx$ d) All diverge e)

NOTA

23. Using the graph to the right, let $g(x) = \int_0^1 f(x) dx$. What is $g(6)$?



- a) 0 b) 6 c) 12 d) 18
 e) NOTA
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24. Let $f(x)$ be a function such that $\int_1^3 f(x)dx = 1$ and $\int_3^4 f(x)dx = 2$. Let $g(x)$ be a function such that $\int_1^4 g(x)dx = 3$. What is $\int_1^4 \frac{2f(x)}{g(x)} dx$?

- a) 0 b) 1 c) 2 d) 3 e) NOTA

25. $\int (e^{3\ln x} + e^{3x}) dx =$

- a) $3 + \frac{e^{3x}}{3} + c$ b) $\frac{x^4}{4} + 3e^{3x} + c$ c) $\frac{e^{x^4}}{4} + 3e^{3x} + c$ d) $\frac{e^{x^4}}{4} + \frac{e^{3x}}{3} + c$ e) NOTA

NOTA

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26. A solid is generated when the region in the first quadrant enclosed by the graph of $y = (x^2 + 1)^3$, the line $x = 1$, the x-axis, and the y-axis is revolved about the x-axis. Its volume is found by evaluating which of the following integrals?

- a) $\int_1^8 (x^2 + 1)^3 dx$ b) $\int_1^8 (x^2 + 1)^6 dx$ c) $\int_0^1 (x^2 + 1)^3 dx$ d) $\int_0^1 (x^2 + 1)^6 dx$ e) NOTA

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

- a) $A + B$ b) $A - B$ c) 0 d) $B - A$ e) NOTA

28. $\int_0^{\frac{1}{2}} \frac{2}{\sqrt{1-x^2}} dx =$

a) $\frac{p}{6}$

b) $\frac{p}{3}$

c) $\frac{-p}{3}$

d) $\frac{2p}{3}$

e) NOTA

29. $\int_{\frac{2}{p}}^{\infty} \frac{\sin\left(\frac{1}{t}\right)}{t^2} dt =$

a) 1

b) 0

c) -1

d) 2

e)

NOTA

30. The slope of the graph of the function $f(x) = \int_0^x (\arcsin t) dt$ when $x = 0.4$ is

a) 0.081

b) 0.389

c) 0.412

d) 1.091

e) NOTA