King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102
Major Exam I
241
October 02, 2024
Net Time Allowed: 90 Minutes

MASTER VERSION

Question 31 Page 303 Section 5.2

1. Use the left end points and 3 rectangles to find an approximation of the area of the region between the graph of the function $f(x) = 2x^2 - x - 1$ and the x-axis over the interval $[2, 5]$

(a) 46 (correct)

(b) 47

(c) 49

(d) 51

(e) 45

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2. The lower sum (in terms of n, the number of subintervals), for the region bounded by the graph of the function $f(x) = 9 - x^2$ on the interval $[0, 2]$ is:

(a) $\frac{46}{3} - \frac{4}{n} - \frac{4}{3n^2}$ (correct)

(b) $\frac{64}{3} - \frac{4}{n} + \frac{4}{3n^2}$

(c) $\frac{46}{3} + \frac{4}{n} - \frac{4}{3n^2}$

(d) $\frac{46}{3} - \frac{4}{n} + \frac{4}{3n^2}$

(e) $\frac{46}{3} + \frac{4}{n} + \frac{4}{3n^2}$

Question 14 Page 313 Section 5.3

3. On the interval $[0, \pi]$, $\lim_{||\triangle|| \to 0} \sum_{i=1}^{n} (2^{-c_i} \sin c_i) \triangle x_i$, where c_i is any point in the i^{th} sub interval, can be written as:

(a) $\int_0^{\pi} 2^{-x} \sin x \, dx$ (correct)

(b) $\int_{\pi}^{0} 2^{-x} \sin x \, dx$

(c) $\int_0^{2^{-\pi}} \sin x \, dx$

(d) $\int_0^{\pi} 2^{x} \sin x \, dx$

(e) $\int_0^{\pi} 2^{-x} \cos x \, dx$

Example 3 Page 310 Section 5.3

4. $\int_1^3 4dx + \int_{-2}^{2} \sqrt{4 - x^2} \, dx =$

(a) $8 + 2\pi$ (correct)

(b) $4 + 2\pi$

(c) $8 + \pi$

(d) $4 + \pi$

(e) $8 - \pi$

Question 68 Page 315 Section 5.3

5. Possible values of a and b that make the statement $\int_a^b \cos x\, dx = 0$ true, are:

(a) $a = \pi,\ b = 2\pi$ (correct)

(b) $a = 0,\ b = \dfrac{\pi}{2}$

(c) $a = \dfrac{\pi}{2},\ b = \dfrac{3\pi}{2}$

(d) $a = 0,\ b = \dfrac{3\pi}{2}$

(e) $a = \dfrac{\pi}{2},\ b = 2\pi$

Example 2 Page 319 Section 5.4

6. $\int_0^2 |2x - 1|\, dx =$

(a) $\dfrac{5}{2}$ (correct)

(b) $\dfrac{7}{2}$

(c) $\dfrac{9}{2}$

(d) $\dfrac{3}{2}$

(e) $\dfrac{11}{2}$

Question 84 Page 330 Section 5.4

7. If $F(x) = \int_2^{x^2} \frac{1}{t^3}\,dt$, then $F'(2) =$

(a) $\frac{1}{16}$ (correct)

(b) $\frac{1}{32}$

(c) $\frac{1}{8}$

(d) $\frac{1}{4}$

(e) $\frac{1}{2}$

Question 18 page 450 Section 7.1

8. The area of the region bounded by the graphs of the equations $y = -x^2 + 3x + 1$ and $y = -x + 1$ is

(a) $\frac{32}{3}$ (correct)

(b) $\frac{31}{3}$

(c) 11

(d) $\frac{34}{3}$

(e) $\frac{35}{3}$

Question 99 Page 384 Review Exercises Chapter 5

9. $\displaystyle\int_0^{\sqrt[3]{\ln 2}} x^2 \operatorname{sech}^2 x^3 \, dx =$

(a) $\dfrac{1}{5}$ (correct)

(b) $\dfrac{2}{5}$

(c) $\dfrac{3}{5}$

(d) $\dfrac{7}{5}$

(e) $\dfrac{6}{5}$

Question 36 Page 370 Section 5.8

10. $\displaystyle\int_{-2}^{3} \frac{dx}{x^2 + 4x + 8} =$

(a) $\dfrac{1}{2} \arctan \dfrac{5}{2}$ (correct)

(b) $\arctan \dfrac{5}{2}$

(c) $\arctan \dfrac{3}{2}$

(d) $\dfrac{1}{2} \arctan \dfrac{3}{2}$

(e) $2 \arctan \dfrac{2}{5}$

Question 28 Page 362 Section 5.7

11. $\int \frac{x(x-2)}{(x-1)^3}\,dx =$

(a) $\ln|x-1| + \frac{1}{2(x-1)^2} + c$ (correct)

(b) $\ln|x-1| + \frac{1}{(x-1)^2} + c$

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

(d) $\ln|x| + \frac{1}{2(x-1)^2} + c$

(e) $\ln|x| + \frac{1}{(x-1)^2} + c$

Question 39 Page 362 Section 5.7

12. $\int \frac{\sec x \tan x}{\sec x - 1}\,dx =$

(a) $\ln|\sec x - 1| + c$ (correct)

(b) $\ln|\tan x - 1| + c$

(c) $\ln|\sec x + 1| + c$

(d) $\ln|\tan x + 1| + c$

(e) $\ln|\sec x + \tan x| + c$

Question 100 Page 343 Section 5.5

13. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (\sin 4x + \cos 4x)\, dx =$

(a) 0 _____ (correct)

(b) 1

(c) 2

(d) -2

(e) -1

Question 78 Page 342 Section 5.5

14. $\int_0^2 \frac{x dx}{\sqrt{1+2x^2}} =$

(a) 1 _____ (correct)

(b) 2

(c) 3

(d) 4

(e) 5