King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102
Major Exam II
241
November 06, 2024
Net Time Allowed: 90 Minutes

MASTER VERSION

Question 58 / Section 8.7 Page 571

1. $\displaystyle\int_0^{\frac{\pi}{2}} \frac{d\theta}{3-2\cos\theta} =$

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

(b) $\dfrac{1}{\sqrt{5}}\arctan\sqrt{5}$

(c) $\dfrac{2}{\sqrt{5}}\arctan 5$

(d) $\dfrac{1}{\sqrt{5}}\arctan 5$

(e) $\sqrt{5}\arctan\sqrt{5}$

Question 6 / Section 8.5 Page 557

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

(a) $\dfrac{-5}{6}\ln|3x+1| + \dfrac{1}{2}\ln|x-1| + c$ (correct)

(b) $\dfrac{-5}{3}\ln|3x+1| + \dfrac{1}{2}\ln|x-1| + c$

(c) $\dfrac{-5}{6}\ln|3x+1| - \dfrac{1}{2}\ln|x-1| + c$

(d) $\dfrac{-5}{3}\ln|3x+1| - \dfrac{1}{2}\ln|x-1| + c$

(e) $\ln|3x+1| - \ln|x-1| + c$

Example 3 / Section 8.5 Page 554

3. If $\dfrac{2x^3-4x-8}{x(x-1)(x^2+4)} = \dfrac{2}{x} - \dfrac{2}{x-1} + \dfrac{Cx+D}{x^2+4}$, then $C+D=$

(a) 6 _____ (correct)

(b) 8

(c) 2

(d) 4

(e) 0

Question 3 / Section 8.4 Page 547

4. $\displaystyle\int \frac{1}{(16-x^2)^{\frac{3}{2}}}\,dx =$

(a) $\dfrac{1}{16}\left(\dfrac{x}{\sqrt{16-x^2}}\right)+c$ _____ (correct)

(b) $\dfrac{1}{4}\left(\dfrac{x}{\sqrt{16-x^2}}\right)+c$

(c) $\dfrac{1}{2}\left(\dfrac{x}{\sqrt{16-x^2}}\right)+c$

(d) $\dfrac{1}{8}\left(\dfrac{x}{\sqrt{16-x^2}}\right)+c$

(e) $\dfrac{x}{\sqrt{16-x^2}}+c$

Example 3 / Section 8.4 Page 543

5. $\int \frac{dx}{(x^2+1)^{\frac{3}{2}}}$

(a) $\frac{x}{\sqrt{x^2+1}} + c$ (correct)

(b) $\frac{\sqrt{x^2+1}}{x} + c$

(c) $\sqrt{x^2+1} + c$

(d) $\frac{1}{\sqrt{x^2+1}} + c$

(e) $\frac{3x}{\sqrt{x^2+1}} + c$

Question 15 / Section 8.3 Page 538

6. $\int_0^{\frac{\pi}{2}} \cos^3 x \, dx =$

(a) $\frac{2}{3}$ (correct)

(b) $\frac{4}{3}$

(c) 1

(d) $\frac{1}{3}$

(e) $\frac{5}{3}$

Question 29 / section 8.3 Page 538

7. $\int \sec^6 4x \tan 4x \, dx =$

(a) $\frac{\sec^6 4x}{24} + c$ (correct)

(b) $\frac{\sec^7 4x}{12} + c$

(c) $\frac{\sec^6 4x}{12} + c$

(d) $\frac{\sec^6 4x}{6} + c$

(e) $\frac{\sec^6 4x}{4} + c$

Question 16 / Section 8.2 Page 529

8. $\int \frac{5x}{e^{2x}} \, dx =$

(a) $\frac{-5}{4} e^{-2x} (2x + 1) + c$ (correct)

(b) $\frac{5}{4} e^{-2x} (2x + 1) + c$

(c) $\frac{-5}{2} e^{-2x} (2x + 1) + c$

(d) $\frac{-5}{4} e^{2x} (2x + 1) + c$

(e) $\frac{-5}{4} e^{-2x} (2x - 1) + c$

Question 32 / Section 8.2 Page 529

9. $\int 4 \arccos x \, dx =$

(a) $4x \arccos x - 4\sqrt{1-x^2} + c$ (correct)

(b) $x \arccos x - \sqrt{1-x^2} + c$

(c) $4 \arcsin x + c$

(d) $4x \arccos x + \sqrt{1-x^2} + c$

(e) $x \arccos x - 2\sqrt{1-x^2} + c$

Example 5 / Section 8.1 Page 518

10. $\int (\cot x) \ln(\sin x) \, dx =$

(a) $\frac{1}{2}[\ln(\sin x)]^2 + c$ (correct)

(b) $[\ln(\sin x)]^2 + c$

(c) $\frac{1}{2} \ln(\sin x) + c$

(d) $\ln(\sin x) + c$

(e) $[\ln(\cos x)]^2 + c$

Question 7 / Section 7.4 Page 481

11. The arc length of the graph of the function $y = \frac{2}{3}(x^2+1)^{\frac{3}{2}}$ over the interval is $[0,1]$ is

(a) $\frac{5}{3}$ (correct)

(b) $\frac{5}{4}$

(c) $\frac{2}{3}$

(d) $\frac{4}{3}$

(e) $\frac{4}{5}$

Question 39 / Section 7.4 Page 482

12. The area of the surface generated by revolving the curve $y = \frac{1}{3}x^3$ on the interval $[0,3]$ about the x-axis is

(a) $\frac{\pi}{9}(82\sqrt{82}-1)$ (correct)

(b) $\frac{\pi}{3}(82\sqrt{82}-1)$

(c) $\frac{\pi}{9}(82\sqrt{82}+1)$

(d) $\frac{\pi}{9}(26\sqrt{26}-1)$

(e) $\frac{\pi}{3}(26\sqrt{26}-1)$

Example 3 / section 7.3 Page 468

13. 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 the y-axis is

(a) $\frac{3\pi}{2}$ (correct)

(b) $\frac{\pi}{2}$

(c) $\frac{5\pi}{2}$

(d) 2π

(e) π

Question 5 / section 7.2 Page 461

14. The volume of the solid formed by revolving the region bounded by the graphs of $y = \sqrt{x}$, $y = 0$, $x = 1$ and $x = 4$, about the x-axis is:

(a) $\frac{15\pi}{2}$ (correct)

(b) $\frac{13\pi}{2}$

(c) $\frac{11\pi}{2}$

(d) $\frac{9\pi}{2}$

(e) $\frac{17\pi}{2}$