

King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102
Exam I
231
October 02, 2023
Net Time Allowed: 120 Minutes

MASTER VERSION

Question 21/ Section 5.4

1. $\int_0^5 |2x - 5| dx =$

(a) $\frac{25}{2}$ _____(correct)

(b) $\frac{23}{2}$

(c) $\frac{21}{2}$

(d) $\frac{27}{2}$

(e) $\frac{29}{2}$

Question 85/ Section 5.4

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

(a) $3 \sin 1$ _____(correct)

(b) $\sin 1$

(c) $2 \sin 1$

(d) $4 \sin 1$

(e) 0

Question 66/ Section 5.3

3. If $\int_{-3}^3 f(x) dx + \int_3^6 f(x) dx - \int_a^b f(x) dx = \int_{-1}^6 f(x) dx$, then $a - b =$

- (a) -2 _____(correct)
(b) -4
(c) 4
(d) -6
(e) 2

Question 27 / Section 5.2

4. Using the summation formulas for $n = 10$, $\sum_{k=1}^n \frac{6k(k-1)}{n^3} =$

- (a) 1.98 _____(correct)
(b) 1.97
(c) 1.90
(d) 1.99
(e) 1.96

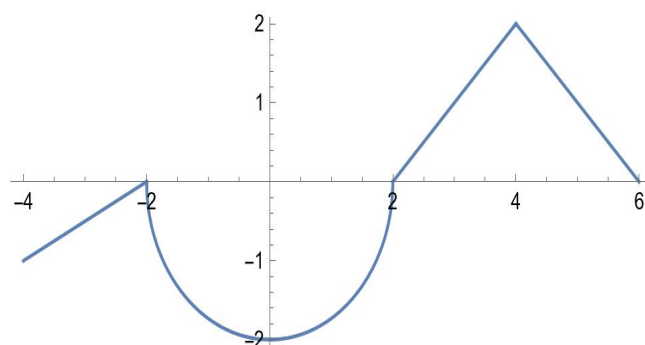
Question 64/ Section 5.2

5. If we use the Midpoint Rule with $n = 4$ to approximate the area of the region bounded by the graph of the function $f(x) = x^2 + 4x$ and the x -axis over the interval $[0, 4]$, then we get

- (a) 53 _____(correct)
(b) 54
(c) 55
(d) 56
(e) 52

Question 51(d)/ Section 5.3

6. Using the attached graph, $\int_{-4}^6 f(x) dx =$



- (a) $3 - 2\pi$ _____(correct)
(b) $4 - 2\pi$
(c) $3 + 2\pi$
(d) $2 - 2\pi$
(e) $4 + 2\pi$

Question 75/ Section 5.3

7. The Riemann sum for $f(x) = x^2 + 3x$ over the interval $[0, 8]$ where $x_0 = 0$, $x_1 = 1$, $x_2 = 3$, $x_3 = 7$ and $x_4 = 8$ and where $c_1 = 1$, $c_2 = 2$, $c_3 = 5$, and $c_4 = 8$, is equal to

(Note: c_i is a point in the i^{th} subinterval)

- (a) 272 _____(correct)
- (b) 273
- (c) 270
- (d) 271
- (e) 274

Question 76/ Section 5.7

8. The average value of the function $f(x) = \sec\left(\frac{\pi x}{6}\right)$ over $[0, 2]$ is equal to

- (a) $\frac{3}{\pi} \ln(2 + \sqrt{3})$ _____(correct)
- (b) $\frac{2}{\pi} \ln(2 - \sqrt{3})$
- (c) $\frac{3}{\pi} \ln(3 + \sqrt{2})$
- (d) $\frac{3}{\pi} \ln(3 - \sqrt{2})$
- (e) $\frac{2}{\pi} \ln(2 + \sqrt{3})$

Question 60/ Section 5.9

$$9. \int_0^{\ln 2} 2e^{-x} \cosh x \, dx =$$

(a) $\frac{3}{8} + \ln 2$ _____(correct)

(b) $\frac{1}{4} - \ln 2$

(c) $\frac{3}{8} + \ln 3$

(d) $\frac{3}{8} - \ln 4$

(e) $\frac{1}{4} + \ln 3$

Question 79/ Section 5.5

$$10. \int_1^9 \frac{dx}{\sqrt{x}(1 + \sqrt{x})^2} =$$

(a) $\frac{1}{2}$ _____(correct)

(b) 1

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

(d) 0

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

Question 94/ Section 5.4

11. Let the velocity function $v(t) = t^2 - t - 12$, in feet per second, be given for a particle moving along a straight line, where t is the time in seconds. The total distance (in feet) that the particle travels over the interval $[1, 5]$ is equal to

- (a) $\frac{79}{3}$ _____(correct)
- (b) $\frac{56}{3}$
- (c) $\frac{77}{3}$
- (d) $\frac{80}{3}$
- (e) $\frac{65}{3}$

Question 68/ Section 5.5

12. $\int (x + 1)\sqrt{2 - x} dx =$

- (a) $\frac{-2}{5}(2 - x)^{3/2}(x + 3) + c$ _____(correct)
- (b) $\frac{-2}{5}(2 - x)^{1/2}(x + 3) + c$
- (c) $\frac{-2}{5}(2 - x)^{3/2}(x - 3) + c$
- (d) $\frac{2}{5}(2 - x)^{3/2}(x - 1) + c$
- (e) $\frac{2}{5}(2 - x)^{1/2}(x - 3) + c$

Question 55/ Section 5.7

13. $\int_0^2 \frac{x^2 - 2}{x + 1} dx =$

- (a) $-\ln 3$ _____(correct)
- (b) $-\ln 2$
- (c) $\ln 3$
- (d) $\ln 2$
- (e) 1

Question 41/ Section 5.7

14. $\int e^{-x} \tan(e^{-x}) dx =$

- (a) $\ln |\cos(e^{-x})| + c$ _____(correct)
- (b) $\ln |\sin(e^{-x})| + c$
- (c) $\ln |\tan(e^{-x})| + c$
- (d) $\ln |\cos(e^x)| + c$
- (e) $\ln |\sin(e^x)| + c$

Question 24/ Section 7.1

15. The area of the region bounded by the graphs of $f(y) = y(2 - y)$ and $g(y) = -y$ is

- (a) $\frac{9}{2}$ _____(correct)
- (b) $\frac{7}{2}$
- (c) $\frac{5}{2}$
- (d) $\frac{11}{2}$
- (e) $\frac{13}{2}$

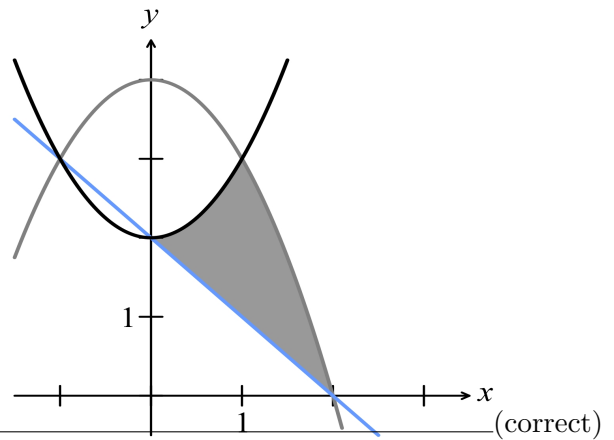
Question 41/ Section 5.8

16. $\int_2^3 \frac{2x - 3}{\sqrt{4x - x^2}} dx =$

- (a) $4 - 2\sqrt{3} + \frac{\pi}{6}$ _____(correct)
- (b) $2 - 4\sqrt{3} + \frac{\pi}{6}$
- (c) $1 - \sqrt{3} + \frac{\pi}{6}$
- (d) $4 + 2\sqrt{3} - \frac{\pi}{6}$
- (e) $4 - 2\sqrt{3} + \frac{\pi}{3}$

Question 51/ Section 7.1

17. The area of the shaded region bounded by the graphs of $y_1 = x^2 + 2$, $y_2 = 4 - x^2$ and $y_3 = 2 - x$, as shown in the figure, is



- (a) 2 _____ (correct)
- (b) 1
- (c) 3
- (d) 4
- (e) 5

Question 43/ Section 5.8

18. $\int \sqrt{e^t - 3} dt =$

- (a) $2\sqrt{e^t - 3} - 2\sqrt{3} \tan^{-1} \sqrt{\frac{e^t - 3}{3}} + c$ _____ (correct)
- (b) $\sqrt{e^t - 3} - \sqrt{3} \tan^{-1} \sqrt{\frac{e^t - 3}{3}} + c$
- (c) $\tan^{-1} \sqrt{\frac{e^t - 3}{3}} + c$
- (d) $2\sqrt{e^t - 3} + \sqrt{3} \tan^{-1} \sqrt{\frac{e^t - 3}{3}} + c$
- (e) $2\sqrt{e^t - 3} - 2\sqrt{3} \tan^{-1} \sqrt{\frac{e^t + 3}{3}} + c$