

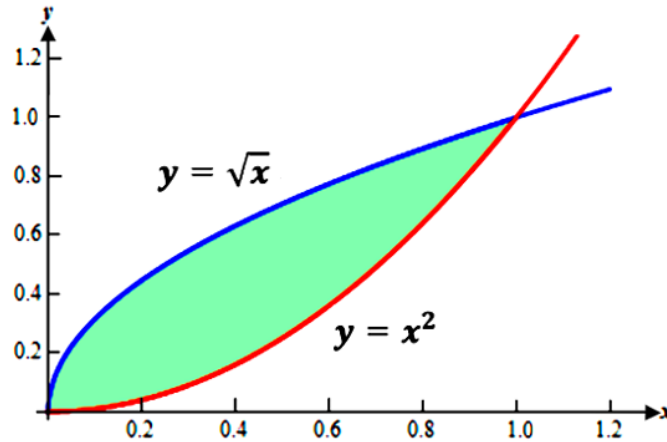
Q.1: Find the area between two curves using definite integrations

Find the area bounded by the graphs

أوجد مساحة المنطقة المحصورة بين التمثيلين

of $y = \sqrt{x}$ and $y = x^2$.

البيانين $y = \sqrt{x}$ و $y = x^2$.



1. $A = \frac{1}{6}$
2. $A = \frac{1}{3}$
3. $A = \frac{8}{3}$
4. $A = \frac{16}{3}$

Q.2: Integrate rational functions using partial fractions in different cases

Evaluate the integral.

أوجد قيمة التكامل.

$$\int \frac{x-5}{x^2-1} dx$$

$$\int \frac{x-5}{x^2-1} dx$$

1. $3 \ln|x+1| + 2 \ln|x-1| + c$
2. $3 \ln|x+1| - 2 \ln|x-1| + c$

3. $2 \ln|x + 1| - 3 \ln|x - 1| + c$

4. $2 \ln|x + 1| + 3 \ln|x - 1| + c$

Q.3: Integrate trigonometric functions using the substitution $x=a \tan(y)$

Evaluate the integral.

$$\int \frac{1}{\sqrt{x^2 + 16}} dx$$

أوجد قيمة التكامل.

$$\int \frac{1}{\sqrt{x^2 + 16}} dx$$

1. $\ln \left| \frac{\sqrt{16 + x^2}}{4} \right| + x + c$

2. $\ln \left| \frac{\sqrt{16 + x^2}}{4} \right| - x + c$

3. $\ln \left| \frac{x + \sqrt{16 + x^2}}{4} \right| + c$

4. $\ln \left| \frac{x - \sqrt{16 + x^2}}{4} \right| + c$

Q.4: Find arc length in a given interval using definite integration

Find the arc length of the portion of the curve $y = 3x + 2$ with $0 \leq x \leq 2$.

أوجد طول القوس لجزء من المنحنى $y = 3x + 2$ مع $0 \leq x \leq 2$.

1. $s = \sqrt{10}$

2. $s = 2\sqrt{10}$

3. $s = \sqrt{5}$

4. $s = 2\sqrt{5}$

Q.5: Find the volume of a solid of revolution using the method of disks

Let R be the region bounded by

$y = x^2, y = 0$ and $x = 1$.

Compute the volume of the solid formed by revolving R about the x -axis.

لتكن R هي المنطقة المحدودة بواسطة

$y = x^2, y = 0$ و $x = 1$.

احسب حجم الجسم الذي تكون من دوران R حول المحور x .

1. $V = \frac{1}{6}\pi$

2. $V = \frac{1}{5}\pi$

3. $V = \frac{1}{2}\pi$

4. $V = \frac{32}{5}\pi$

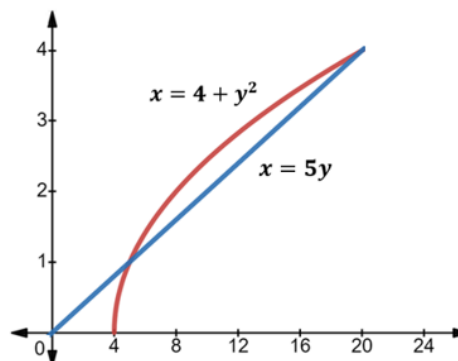
Q.6: Compute the area of a region using definite integration with y as a variable

Find the area bounded by the curves

$x = 5y$ and $x = 4 + y^2$.

أوجد مساحة المنطقة المحصورة بين المنحنيات

$x = 4 + y^2$ و $x = 5y$.



$$1. \quad A = \int_1^4 (5y - (4 + y^2)) dy$$

$$2. \quad A = \int_5^{20} ((4 + y^2) - 5y) dy$$

$$3. \quad A = \int_5^{20} (5x - (4 + x^2)) dx$$

$$4. \quad A = \int_1^4 ((4 + x^2) - 5x) dx$$

Q.7: Learn differential equations of the form $y'=ky$ and their general solution

Find the solution of the differential equation $y' = y - 50$ satisfying the initial condition $y(0) = 70$.

أوجد حل المعادلة التفاضلية $y' = y - 50$ والتي تحقق الشرط الابتدائي $y(0) = 70$.

$$1. \quad y = 20e^t - 50$$

$$2. \quad y = e^t + 50$$

$$3. \quad y = 50e^t + 20$$

$$4. \quad y = 20e^t + 50$$

Q.8: Use integration by parts to compute definite and indefinite integrals

Evaluate the integral.

$$\int_1^2 xe^x dx$$

أوجد قيمة التكامل.

$$\int_1^2 xe^x dx$$

$$1. \quad 1$$

$$2. \quad e^2 - 1$$

3. $e^2 + 1$

4. e^2

Q.9: Integrate trigonometric functions using the substitution $x=a \sec(y)$

Which substitution can be used to evaluate the integral?

ما التعويض الذي يمكن استخدامه لإيجاد قيمة التكامل؟

$$\int \frac{1}{\sqrt{x^2 - 25}} dx$$

$$\int \frac{1}{\sqrt{x^2 - 25}} dx$$

1. $x = 5 \sin \theta$

2. $x = 5 \sec \theta$

3. $x = 5 \tan \theta$

4. $x = \sec \theta \tan \theta$

Q.10: Integrate functions of the form $\sin^n(x) \cos^m(x)$

Evaluate the integral.

أوجد قيمة التكامل.

$$\int \cos^2 x \sin x dx$$

$$\int \cos^2 x \sin x dx$$

1. $-\frac{\cos^3 x}{3} + c$

2. $-\frac{\sin^3 x}{3} + c$

3. $\frac{\cos^3 x}{3} + c$

4.
$$\frac{\sin^3 x}{3} + c$$

Q.11: Solve problems involving differential equations of the form $y'=ky$ satisfying an indicated initial condition

If you invest AED 1000 at an annual morabaha rate of 8%, find the value of the investment after 5 years under continuous compounding.

إذا استثمرت AED 1000 بمعدل مرابحة سنوية 8%، أوجد قيمة الاستثمار بعد 5 سنوات مع مرابحة مركبة مستمرة.

1.
$$\text{AED } 1469.3$$

2.
$$\text{AED } 1489.8$$

3.
$$\text{AED } 1479.6$$

4.
$$\text{AED } 1491.8$$

Q.12: Use integration by parts to compute definite and indefinite integrals

Evaluate the integral.

$$\int x^2 \ln x \, dx$$

أوجد قيمة التكامل.

$$\int x^2 \ln x \, dx$$

1.
$$\frac{x^3 \ln x}{3} - \frac{x^3}{9} + c$$

2.
$$\frac{x^3 \ln x}{3} - \frac{x^2}{3} + c$$

3.
$$\frac{x^3 \ln x}{3} + \frac{x^3}{9} + c$$

4.
$$\frac{x^3 \ln x}{3} + \frac{x^2}{3} + c$$

Q.13: Compute volume by means of definite integration using areas of cross sections

Find the volume of the solid with cross sectional area

أوجد حجم الجسم مع مساحة المقطع العرضي $A(x) = 2(x + 1)^2$ لكل $1 \leq x \leq 4$.

$A(x) = 2(x + 1)^2$ for $1 \leq x \leq 4$.

1.
$$V = \frac{21}{2}$$

2.
$$V = 21$$

3.
$$V = 39$$

4.
$$V = 78$$

Q.14: Solve physical problems involving velocity

An object is dropped from a height of 50 ft.

أسقط جسم من ارتفاع 50 ft.

حدد الشروط الابتدائية $y(0)$ و $y'(0)$.

Identify the initial conditions $y(0)$ and $y'(0)$.

1.
$$y(0) = 50, y'(0) = 0$$

2.
$$y(0) = -50, y'(0) = 0$$

3.
$$y(0) = 0, y'(0) = 50$$

4.
$$y(0) = 0, y'(0) = -50$$

Q.15: Compute various interlays using integration by substitution

Evaluate the integral.

$$\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$$

أوجد قيمة التكامل.

$$\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$$

1. $-2 \sin \sqrt{x} + c$

2. $-2 \cos \sqrt{x} + c$

3. $2 \cos \sqrt{x} + c$

4. $2 \sin \sqrt{x} + c$

Q.16: Find the volume of a solid of revolution by using the method of washers

Let R be the region bounded by

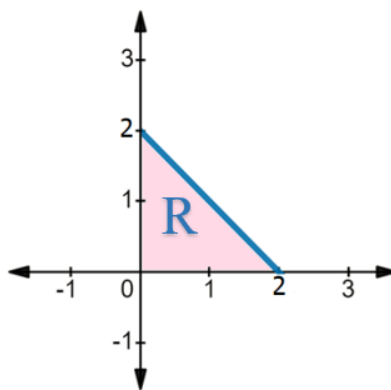
$$y = 2 - x, y = 0 \text{ and } x = 0.$$

Compute the volume of the solid formed by revolving R about the $y = 3$.

لتكن R هي المنطقة المحدودة بواسطة

$$x = 0 \text{ و } y = 0, y = 2 - x$$

احسب حجم المجسم الذي تكون من دوران R حول $y = 3$.



1.
$$V = \int_0^2 \pi (3)^2 dx - \int_0^2 \pi (2 - x)^2 dx$$

2.
$$V = \int_0^2 \pi (3 - (2 - x))^2 dx$$

$$V = \int_0^2 \pi (3)^2 dx - \int_0^2 \pi (3 - (2 - x))^2 dx$$

3.

$$V = \int_0^2 \pi (3) dx - \int_0^2 \pi (3 - (2 - x))^2 dx$$

4.

Q.17: Solve problems on projectiles

Find the time of flight of an object launched at angle 30° with initial speed 40 m/s.

أوجد زمن التحليق لجسم أطلق بزاوية 30° مع سرعة ابتدائية 40 m/s.

$$t = 4.08 \text{ s}$$

1.

$$t = 7.07 \text{ s}$$

2.

$$t = 10 \text{ s}$$

3.

$$t = 17.3 \text{ s}$$

4.

Q.18: Solve mathematical problems involving applications on arc length or surface area

A rope is to be hung between two poles 40 m apart. If the rope assumes the shape of the catenary $y = 10(e^{x/20} + e^{-x/20})$, $-20 \leq x \leq 20$, compute the length of the rope.

تم تعليق حبل بين عمودين البعد بينهما 40 m.

إذا كان الحبل يبدو أنه يتخذ شكل سلسلة معادلتها

$$y = 10(e^{x/20} + e^{-x/20})$$

، احسب طول الحبل.

$$s = 20(e - e^{-1}) \text{ m}$$

1.

$$s = 20(e^{-1} - e) \text{ m}$$

2.

$$s = 10(e - e^{-1}) \text{ m}$$

3.

$$s = 40(e - e^{-1}) \text{ m}$$

4.

Q.19: Compute integrals using completing a square before integrating

Evaluate the integral.

أوجد قيمة التكامل.

$$\int \frac{1}{\sqrt{3-2x-x^2}} dx$$

$$\int \frac{1}{\sqrt{3-2x-x^2}} dx$$

$$\sin^{-1} \left(\frac{x+1}{2} \right) + c$$

1.

$$\frac{1}{2} \tan^{-1} \left(\frac{x+1}{2} \right) + c$$

2.

$$\frac{1}{2} \sin^{-1} \left(\frac{x+1}{2} \right) + c$$

3.

$$\tan^{-1} \left(\frac{x+1}{2} \right) + c$$

4.

Q.20: Compute integrals using direct computation and rules

Evaluate the integral.

أوجد قيمة التكامل.

$$\int \frac{2}{4+4x^2} dx$$

$$\int \frac{2}{4+4x^2} dx$$

$$\frac{1}{2} \tan^{-1} x + c$$

1.

$$\frac{1}{2} \sin^{-1} x + c$$

2.

$$2 \tan^{-1} x + c$$

3.

$$2 \sin^{-1} x + c$$

4.

Q.21: Find the general solution of separable differential equations of first order

The differential equation is
separable.

المعادلة التفاضلية قابلة للفصل.

أوجد الحل العام، بصيغة صريحة إذا أمكن.

Find the general solution, in an
explicit form if possible.

$$y' = \frac{2}{xy + y}$$

$$y' = \frac{2}{xy + y}$$

$$y = \frac{1}{2}x^2 + x + c$$

1.

$$\frac{y^2}{2} = \frac{1}{2}x^2 + x + c$$

2.

$$y = \ln|2x + 1| + c$$

3.

$$\frac{y^2}{2} = 2 \ln|x + 1| + c$$

4.

Q.22: Find surface area of a solid of revolution using definite integration

Find the surface area of the surface
generated by revolving $y = x^2$, for
 $0 \leq x \leq 1$, about the x -axis.

أوجد مساحة السطح المتولد من تدوير المنحنى

$y = x^2$ ، لكل $0 \leq x \leq 1$ ،

حول المحور x .

$$S = \int_0^1 4\pi x \sqrt{1 + 2x} dx$$

1.

$$S = \int_0^1 4\pi x \sqrt{1 + (2x)^2} dx$$

2.

$$S = \int_0^1 2\pi x^2 \sqrt{1 + (2x)^2} dx$$

3.

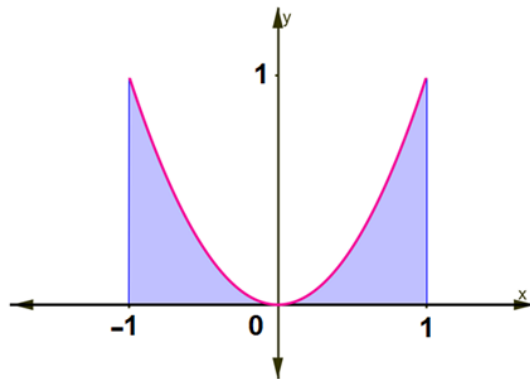
$$S = \int_0^1 2\pi x^2 \sqrt{1 + 2x} dx$$

4.

Q.23: Find the volume of a solid of revolution by using the method of cylindrical shells

Use the method of cylindrical shells to find the volume of the region bounded by $y = x^2$ and the x -axis, $-1 \leq x \leq 1$, revolved about $x = 2$.

استخدم طريقة الأصداف الأسطوانية لإيجاد الحجم الذي تكون من دوران المنطقة المحدودة بواسطة $y = x^2$ والمحور x ، لكل $-1 \leq x \leq 1$ ، حول $x = 2$.



$$V = \int_{-1}^1 2\pi (2 - x)x^2 dx$$

1.

$$V = \int_{-1}^1 2\pi (2 + x)x^2 dx$$

2.

$$V = \int_{-1}^1 2\pi x(2 - x)^2 dx$$

3.

$$V = \int_{-1}^1 2\pi x(2 + x)^2 dx$$

4.

Q.24: Integrate functions of the form $\sec^m(x) \tan^n(x)$

Evaluate the integral.

$$\int \tan x \sec^3 x dx$$

أوجد قيمة التكامل.

$$\int \tan x \sec^3 x dx$$

$$\frac{\sec^3 x}{3} + c$$

1.

2. $-\frac{\sec^3 x}{3} + c$

3. $\frac{\tan^3 x}{3} + c$

4. $-\frac{\tan^3 x}{3} + c$

Q.25: Integrate trigonometric functions using the substitution $x=a \sin(y)$

Evaluate the integral.

$$\int_0^2 \sqrt{4-x^2} dx$$

أوجد قيمة التكامل.

$$\int_0^2 \sqrt{4-x^2} dx$$

1. $\frac{\pi}{4}$

2. $\frac{\pi}{2}$

3. π

4. 2π