1 $y = 2x^3 + 5x^2 - 7x + 10$

Find $\int y \, dx$

$$\int y \, dx = \frac{2x^4}{4} + \frac{5x^3}{3} - \frac{7x^2}{2} + 10x + c$$

$$= \frac{1}{2}x^4 + \frac{5}{3}x^3 - \frac{7}{2}x^2 + 10x + c$$

2 Find $\int (3x^2 + 7x - 2) \, dx$

$$\frac{3x^3}{3} + \frac{7x^2}{2} - 2x + c$$

$$x^3 + \frac{7}{2}x^2 - 2x + c$$

3 Find $\int (x + 4)(x - 3) \, dx$

$$\int x^2 - 3x + 4x - 12 \, dx$$

$$\int x^2 + x - 12 \, dx$$

$$\frac{x^3}{3} + \frac{x^2}{2} - 12x + c$$

$$\frac{1}{3}x^3 + \frac{1}{2}x^2 - 12x + c$$

4 $f'(x) = 6x^2 - 3x + 8$

Given that the point (1, 8) lies on $y = f(x)$

Find an expression for $f(x)$

$$f(x) = \frac{6x^3}{3} - \frac{3x^2}{2} + 8x + C$$

$$= 2x^3 - \frac{3}{2}x^2 + 8x + c$$

$$y = 2x^3 - \frac{3}{2}x^2 + 8x + c$$

$$8 = 2(1)^3 - \frac{3}{2}(1)^2 + 8(1) + C$$

$$8 = \frac{17}{2} + C$$

$$c = -\frac{1}{2}$$

$$\underline{y = 2x^3 - \frac{3}{2}x^2 + 8x - \frac{1}{2}}$$

---

5 $y = 4\sqrt{x} + \frac{1}{x^2} + 10$

Find $\int y \, dx$

$$y = 4x^{\frac{1}{2}} + x^{-2} + 10$$

$$\int y \, dx = \frac{4x^{\frac{3}{2}}}{3/2} + \frac{x^{-1}}{-1} + 10x + C$$

$$\underline{= \frac{8}{3}x^{\frac{3}{2}} - x^{-1} + 10x + C}$$

6 Find $\int_1^3 (x+4)(x-3) \; dx$

$$\int_1^3 x^2 + x - 12 \quad dx$$

$$\left[\frac{x^3}{3} + \frac{x^2}{2} - 12x \right]_1^3$$

$$\left(\frac{(3)^3}{3} + \frac{(3)^2}{2} - 12(3) \right) - \left(\frac{(1)^3}{3} + \frac{(1)^2}{2} - 12(1) \right)$$

$$= \underline{\underline{\frac{-34}{3}}}$$

---

7 $\frac{dy}{dx} = 10x^4 - 5$

Given that the point (2, 30) lies on the curve

Find an expression for y in terms of x

$$y = \frac{10x^5}{5} - 5x + c$$

$$y = 2x^5 - 5x + c$$

$$30 = 2(2)^5 - 5(2) + c$$

$$30 = 54 + c$$

$$c = -24$$

$$\underline{\underline{y = 2x^5 - 5x - 24}}$$

8 Find $\int_1^4 5 + \frac{1}{\sqrt{x}}\ dx$

$$\int_1^4 5 + x^{-\frac{1}{2}}\ dx$$

$$\left[5x + 2x^{\frac{1}{2}}\right]_1^4$$

$$\left(5(4) + 2(4)^{\frac{1}{2}}\right) - \left(5(1) + 2(1)^{\frac{1}{2}}\right)$$

$$\underline{\underline{17}}$$

---

9 The curve with the equation f(x) passes through the point (1, 2)

Given that $f'(x) = 5 + \dfrac{3x^2 + 2}{x^{\frac{1}{2}}}$

Find f(x) giving your answer in its simplest form.

$$f'(x) = 5 + 3x^{\frac{3}{2}} + 2x^{-\frac{1}{2}}$$

$$f(x) = 5x + \frac{3x^{\frac{5}{2}}}{5/2} + \frac{2x^{\frac{1}{2}}}{1/2} + c$$

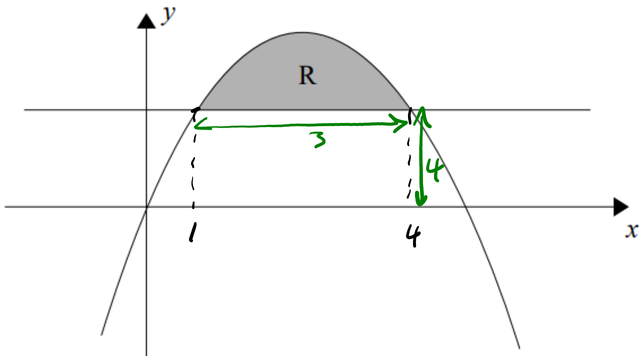
$$= 5x + \frac{6}{5}x^{\frac{5}{2}} + 4x^{\frac{1}{2}} + c$$

$$2 = 5(1) + \frac{6}{5}(1)^{5/2} + 4(1)^{\frac{1}{2}} + c$$

$$c = -\frac{41}{5}$$

$$\underline{\underline{f(x) = 5x + \frac{6}{5}x^{\frac{5}{2}} + 4x^{\frac{1}{2}} - \frac{41}{5}}}$$

10



$3 \times 4 = 12$

The sketch shows the curve $y = x(5 - x)$ and the line $y = 4$

(a) Find the coordinates of the points where the line intersects the curve. **(2)**

(b) Find the area of the shaded region R. **(6)**

a/ $4 = x(5 - x)$

$4 = 5x - x^2$

$x^2 - 5x + 4 = 0$

$(x - 1)(x - 4) = 0$

$\underline{x = 1}$ $\quad \underline{x = 4}$

$(1, 4)$ and $(4, 4)$

b/ $\text{Area} = \int_1^4 5x - x^2 \, dx - 12$

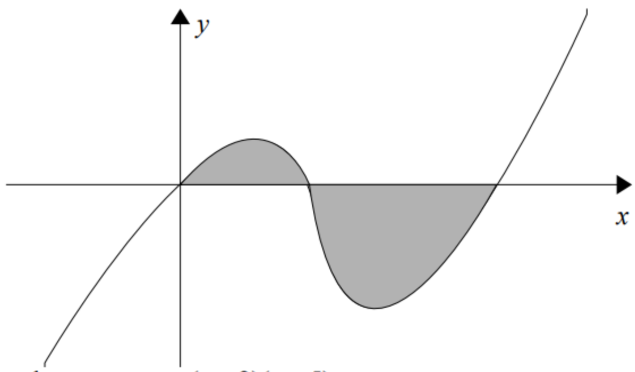
$= \left[\frac{5}{2}x^2 - \frac{1}{3}x^3\right]_1^4 - 12$

$= \left(\frac{5}{2}(4)^2 - \frac{1}{3}(4)^3\right) - \left(\frac{5}{2}(1)^2 - \frac{1}{3}(1)^3\right) - 12$

$= \frac{33}{2} - 12$

$= \frac{9}{2} \text{ units}^2$

11



The sketch shows the curve $y = x(x-2)(x-5)$

(a) Write down the values of x where the curve crosses the x axis. **(1)**

(b) Find the area of the shaded region. **(8)**

a) $x = 0 \qquad x = 2 \qquad x = 5$

$$\int_0^2 x(x-2)(x-5)\, dx$$

$$= \frac{16}{3}$$

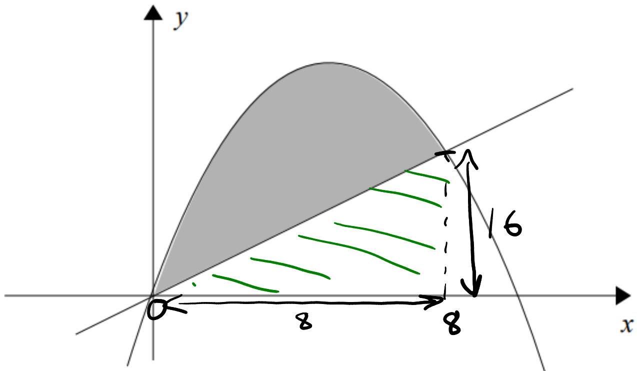
$$\int_2^5 x(x-2)(x-5)\, dx$$

$$-\frac{63}{4}$$

$$\text{Total Area} = \frac{16}{3} + \frac{63}{4}$$

$$= \frac{253}{12} \text{ units}^2$$

12



The sketch shows the curve $y = 10x - x^2$ and the straight line $y = 2x$

(a) Find the coordinates of the points where the line intersects the curve. **(2)**

(b) Find the area of the shaded region. **(6)**

a/

$$10x - x^2 = 2x$$

$$0 = x^2 - 8x$$

$$0 = x(x-8)$$

$$x = 0 \quad x = 8$$

$$y = 0 \quad y = 16$$

$(0,0)$ and $(8,16)$

b/ Area of triangle $= \frac{1}{2} \cdot 8 \cdot 16$

$= 64$ units^2

$$\int_0^8 10x - x^2 \, dx$$

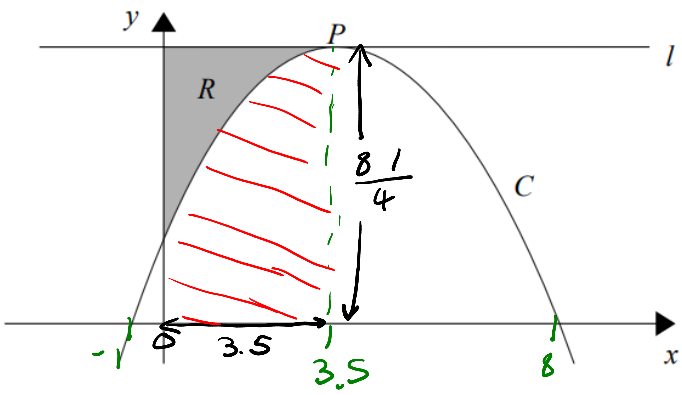
$$\left[5x^2 - \frac{1}{3}x^3 \right]_0^8$$

$\frac{448}{3}$ units^2

Shaded Area $= \frac{448}{3} - 64$

$= \frac{256}{3}$ units^2

13



The sketch shows the curve C with equation $y = (x + 1)(8 - x)$
The maximum point of curve C is P.
The line l passes through P and is parallel to the x-axis.
The shaded region R is bounded by the curve C, the line l and the y-axis.

Find the area of the shaded region R.

Max point when $x = 3.5$ (middle of -1 and 8)

$$y = (3.5+1)(8-3.5)$$

$$= \frac{81}{4}$$

$$P: \left(\frac{7}{2}, \frac{81}{4}\right)$$

Area of rectangle $= \frac{7}{2} \cdot \frac{81}{4} = \frac{567}{8}$ units^2

$$\int_0^{7/2} (x+1)(8-x)\,dx = \frac{679}{12} \text{ units}^2$$

Shaded Area $= \frac{567}{8} - \frac{679}{12} = \frac{343}{24}$ units^2

14 $\dfrac{dy}{dx} = \dfrac{1}{3x^2}$

Find an expression for y in terms of x

$$\frac{dy}{dx} = \frac{1}{3}x^{-2}$$

$$y = -\frac{1}{3}x^{-1} + c$$

---

15 $f'(x) = (2x - 1)^2$ and $f(2) = 5$

Find an expression for $f(x)$

$$f'(x) = 4x^2 - 4x + 1$$

$$f(x) = \frac{4}{3}x^3 - 2x^2 + x + c$$

$$5 = \frac{4}{3}(2)^3 - 2(2)^2 + 2 + c$$

$$5 = \frac{14}{3} + c$$

$$c = \frac{1}{3}$$

$$f(x) = \frac{4}{3}x^3 - 2x^2 + x + \frac{1}{3}$$

16 A curve cuts the x-axis at (2, 0) and has the gradient function $\frac{dy}{dx} = \frac{8}{x^2}$

Find the equation of the curve

$$\frac{dy}{dx} = 8x^{-2}$$

$$y = -8x^{-1} + c$$

$$0 = -8(2)^{-1} + c$$

$$0 = -4 + c$$

$$c = 4$$

$$\underline{\underline{y = -8x^{-1} + 4}}$$

---

17 A curve C has equation $y = \frac{3}{2\sqrt{x}}$

The region enclosed between the curve, the x-axis and the lines $x = 1$ and $x = k$ area 12 units.

Given $k > 1$, find the value of k.
Fully justify your answer.

$$y = \frac{3}{2}x^{-\frac{1}{2}}$$

$$\int_1^k \frac{3}{2}x^{-\frac{1}{2}}\,dx = 12$$

$$\left[3x^{\frac{1}{2}}\right]_1^k = 12$$

$$3k^{\frac{1}{2}} - 3(1)^{\frac{1}{2}} = 12$$

$$3\sqrt{k} - 3 = 12$$

$$\sqrt{k} = 5$$

$$\underline{\underline{k = 25}}$$

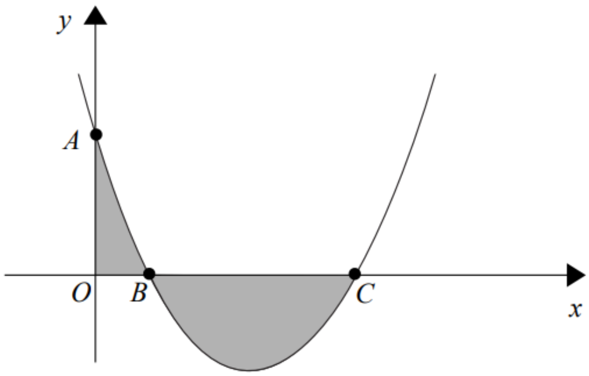
18 $\dfrac{dy}{dx} = \dfrac{5}{x^2}$

Find an expression for y

$$\frac{dy}{dx} = 5x^{-2}$$

$$y = -5x^{-1} + c$$

19



The diagram shows the curve with equation $y = x^2 - 6x + 5$

(a) Write down the coordinates of the points A, B and C.

(b) Find the total area of the two shaded regions.
Fully justify your answer.

a/ A: $(0, 5)$ (when $x = 0$, $y = 5$)

$0 = x^2 - 6x + 5$ (crosses x when $y = 0$)

$0 = (x - 5)(x - 1)$

$x = 5 \quad x = 1$

B: $(1, 0)$ C: $(5, 0)$

b/ $\displaystyle\int_0^1 x^2 - 6x + 5 \, dx = \frac{7}{3}$

$\displaystyle\int_1^5 x^2 - 6x + 5 \, dx = -\frac{32}{3}$

$\dfrac{7}{3} + \dfrac{32}{3} = 13 \text{ units}^2$

20 Find $\int \left(4\sqrt{x} - 2\right) \mathrm{d}x$

writing your answer in its simplest form.

$$\int 4x^{\frac{1}{2}} - 2 \quad dx$$

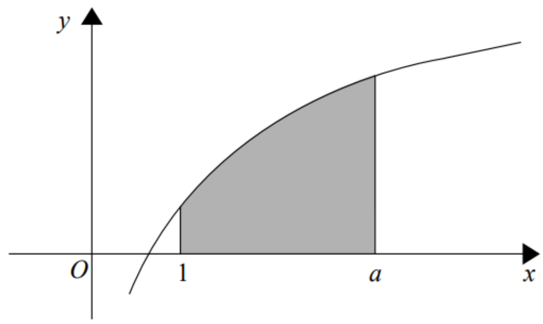
$$\frac{4x^{\frac{3}{2}}}{3/2} - 2x + c$$

$$\underline{\underline{\frac{8}{3}x^{\frac{3}{2}} - 2x + c}}$$

---

21 The diagram shows part of the graph of $y = 8x^{\frac{1}{3}} - \dfrac{4}{x^{\frac{1}{3}}}$

The shaded region is enclosed by the curve, the x-axis and the lines $x = 1$ and $x = a$, where $a > 1$



Given that the area of the shaded area is 36 square units, find the exact value of a.

$$y = 8x^{\frac{1}{3}} - 4x^{-\frac{1}{3}}$$

$$\int_1^a 8x^{\frac{1}{3}} - 4x^{-\frac{1}{3}} \, dx = 36$$

$$\left[6x^{\frac{4}{3}} - 6x^{\frac{2}{3}}\right]_1^a = 36$$

$$\left(6a^{\frac{4}{3}} - 6a^{\frac{2}{3}}\right) - \left(6(1)^{\frac{4}{3}} - 6(1)^{\frac{2}{3}}\right) = 36$$

$$6a^{\frac{4}{3}} - 6a^{\frac{2}{3}} = 36$$

$$a^{\frac{4}{3}} - a^{\frac{2}{3}} = 6$$

$$a^{\frac{4}{3}} - a^{\frac{2}{3}} - 6 = 0$$

$$\left(a^{\frac{2}{3}} - 3\right)\left(a^{\frac{2}{3}} + 2\right) = 0$$

$a^{\frac{2}{3}} = 3 \qquad a^{\frac{2}{3}} = -2$

no sols.

$a^2 = 27$

$\underline{\underline{a = \sqrt{27}}}$

22 Find $\int \left(2x^3 + \sqrt{x} + 2\right) dx$

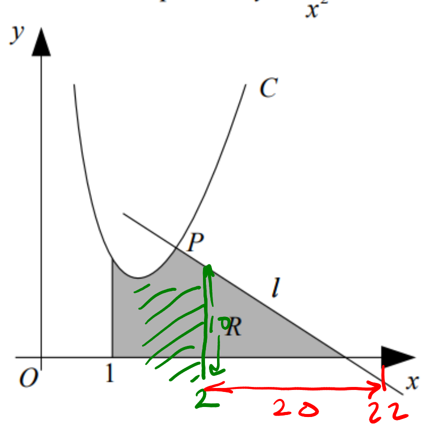
Giving your answer in its simplest form.

$$\int 2x^3 + x^{\frac{1}{2}} + 2 \quad dx$$

$$\underline{\frac{1}{2}x^4 + \frac{2}{3}x^{\frac{3}{2}} + 2x + c}$$

---

23 The graph shows part of the curve with equation $y = \frac{8}{x^2} + 4x$



$P(2, 10)$ lies on C.
Line l is the normal to C at P.

Region R is bounded by the curve C, the line l and the line with equation $x = 1$.
Show that the area of R is 110.

$$y = 8x^{-2} + 4x$$

$$\frac{dy}{dx} = -16x^{-3} + 4$$

when $x = 2$ $\quad \frac{dy}{dx} = 2 \quad m = -\frac{1}{2}$ (perp.)

l: $\quad y - 10 = -\frac{1}{2}(x - 2)$

$$2y - 20 = -(x - 2)$$

$$2y - 20 = -x + 2$$

$$2y = -x + 22$$

crosses x when $y = 0$ $\quad \underline{x = 22}$

Area of triangle $= \frac{1}{2} \cdot 20 \cdot 10 = 100$ units^2

$$\int_1^2 8x^{-2} + 4x \quad dx = 10 \text{ units}^2$$

$$100 + 10 = \underline{110 \text{ units}^2}$$

24 (a) Given that k is a constant, find $\int \left(\frac{k}{x^3} + 2x\right) \mathrm{d}x$

Giving your answer in its simplest form. **(3)**

(b) Find the value of k such that $\int_1^2 \left(\frac{k}{x^3} + 2x\right) \mathrm{d}x = 12$ **(3)**

a/ $\int kx^{-3} + 2x \quad dx$

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

b/ $\left[-\frac{1}{2}kx^{-2} + x^2\right]_1^2 = 12$

$\left(-\frac{1}{2}k(2)^{-2} + (2)^2\right) - \left(-\frac{1}{2}k(1)^{-2} + (1)^2\right) = 12$

$\left(-\frac{1}{8}k + 4\right) - \left(-\frac{1}{2}k + 1\right) = 12$

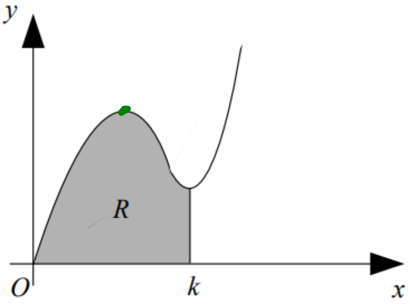
$-\frac{1}{8}k + 4 + \frac{1}{2}k - 1 = 12$

$\frac{3}{8}k + 3 = 12$

$\frac{3}{8}k = 9$

$\underline{\underline{k = 24}}$

25 The graph shows part of the curve C with equation $y = x^3 - 7x^2 + 15x$



The curve has a minimum turning point at k.

Region R is bounded by the curve C, x-axis and the line with equation $x = k$.

Show that the area of R is $\frac{99}{4}$

(Total for question 25 is 7 marks)

turning point where $\frac{dy}{dx} = 0$

$$\frac{dy}{dx} = 3x^2 - 14x + 15$$

$$3x^2 - 14x + 15 = 0$$

$x = 3$ $\quad$ $x = \frac{5}{3}$ → Maximum (seen on graph)

$$\int_0^3 x^3 - 7x^2 + 15x \, dx$$

$$\left[\frac{1}{4}x^4 - \frac{7}{3}x^3 + \frac{15}{2}x^2 \right]_0^3$$

$$\left(\frac{1}{4}(3)^4 - \frac{7}{3}(3)^3 + \frac{15}{2}(3)^2 \right) - (0)$$

$\frac{99}{4}$ units^2

26 Given that k is a positive constant and $\int_1^k \left(\frac{3}{2\sqrt{x}} + 9\right) \mathrm{d}x = 8$

(a) Show that $9k + 3\sqrt{k} - 20 = 0$

(b) Hence, using algebra, find any values of k such that $\int_1^k \left(\frac{3}{2\sqrt{x}} + 9\right) \mathrm{d}x = 8$

$$\int_1^k \frac{3}{2}x^{-\frac{1}{2}} + 9 \quad dx = 8$$

$$\left[3x^{\frac{1}{2}} + 9x\right]_1^k = 8$$

$$\left(3k^{\frac{1}{2}} + 9k\right) - \left(3(1)^{\frac{1}{2}} + 9(1)\right) = 8$$

$$3k^{\frac{1}{2}} + 9k - 3 - 9 = 8$$

$$3k^{\frac{1}{2}} + 9k - 20 = 0$$

$$9k + 3\sqrt{k} - 20 = 0$$

b)
$$(3\sqrt{k} - 4)(3\sqrt{k} + 5) = 0$$

$$\sqrt{k} = \frac{4}{3} \qquad \sqrt{k} = -\frac{5}{3}$$

$$k = \frac{16}{9} \qquad \text{no sol}$$

27 $$f(x) = 2x^3 - x^2 - 8x + 4$$

(a) Use the factor theorem to show that $(x + 2)$ is a factor of $f(x)$ **(2)**

(b) Hence, showing all your working, write $f(x)$ as a product of three linear factors. **(4)**

The finite region R is bounded by the curve with equation $y = f(x)$ and the x-axis, and lies below the x-axis

(c) Find, using algebraic integration, the exact value of the area of R **(4)**

a/ $f(-2) = 2(-2)^3 - (-2)^2 - 8(-2) + 4$

$= 0$

$f(-2) = 0 \quad \therefore \quad (x+2)$ is a factor

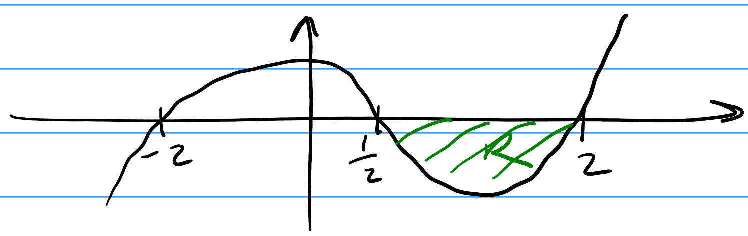
b/

$$\begin{array}{r|l} & 2x^2 - 5x + 2 \\ \hline x+2 & 2x^3 - x^2 - 8x + 4 \\ & \underline{2x^3 + 4x^2} \\ & \quad -5x^2 - 8x \\ & \quad \underline{-5x^2 - 10x} \\ & \qquad 2x + 4 \\ & \qquad \underline{2x + 4} \\ & \qquad\quad 0 \end{array}$$

$(x+2)(2x^2 - 5x + 2)$

$(x+2)(2x-1)(x-2)$

c/



$$\int_{\frac{1}{2}}^{2} 2x^3 - x^2 - 8x + 4 \; dx$$

$$\left[\frac{1}{2}x^4 - \frac{1}{3}x^3 - 4x^2 + 4x \right]_{\frac{1}{2}}^{2}$$

$$\left(\tfrac{1}{2}(4)^4 - \tfrac{1}{3}(4)^3 - 4(4)^2 + 4(4)\right) - \left(\tfrac{1}{2}\left(\tfrac{1}{2}\right)^4 - \tfrac{1}{3}\left(\tfrac{1}{2}\right)^3 - 4\left(\tfrac{1}{2}\right)^2 + 4\left(\tfrac{1}{2}\right)\right)$$

$\frac{117}{32}$ units^2

28 Find $\int \left(\frac{4x^3 - 5}{3x^2} \right) dx$

writing your answer in its simplest form.

$$\int \frac{4x^3}{3x^2} - \frac{5}{3x^2} \quad dx$$

$$\int \frac{4}{3} x^2 - \frac{5}{3} x^{-2} \quad dx$$

$$\underline{\underline{\frac{4}{9} x^3 + \frac{5}{3} x^{-1} + c}}$$

---

29 Find the value of k such that $\int_1^8 \left(\frac{k}{\sqrt[3]{x}} \right) dx = 22.5$

$$\int_1^8 k x^{-\frac{1}{3}} = 22.5$$

$$\left[\frac{3}{2} k x^{\frac{2}{3}} \right]_1^8 = 22.5$$

$$\frac{3}{2} k (8)^{\frac{2}{3}} - \frac{3}{2} k (1)^{\frac{2}{3}} = 22.5$$

$$6k - \frac{3}{2} k = 22.5$$

$$\frac{9}{2} k = 22.5$$

$$\underline{\underline{k = 5}}$$

30 Find the value of k such that $\int_k^9 \left(\frac{10}{\sqrt{x}}\right) \mathrm{d}x = 20$

$$\int_k^9 10x^{-\frac{1}{2}}\,dx = 20$$

$$\left[20x^{\frac{1}{2}}\right]_k^9 = 20$$

$$20(9)^{\frac{1}{2}} - 20k^{\frac{1}{2}} = 20$$

$$60 - 20k^{\frac{1}{2}} = 20$$

$$40 = 20k^{\frac{1}{2}}$$

$$2 = k^{\frac{1}{2}}$$

$$\underline{\underline{k = 4}}$$

31 (a) Find $\int (2x - x^2)\, dx$

(b) Evaluate $\int_0^4 (2x - x^2)\, dx$

(c) Using a sketch, explain why the integral in part (b) does not give the area enclosed between the curve $y = 2x - x^2$ and the x-axis

a/ $\frac{2x^2}{2} - \frac{x^3}{3} + c$

$x^2 - \frac{1}{3}x^3 + c$

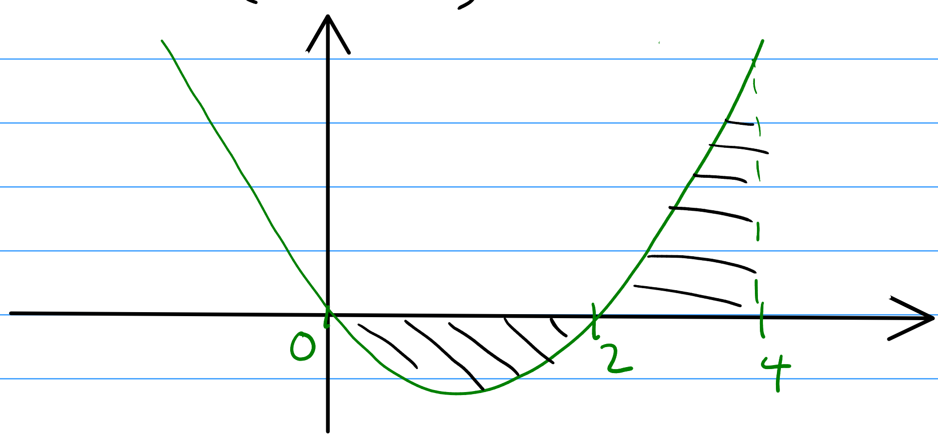
b/ $\left[x^2 - \frac{1}{3}x^3\right]_0^4$

$\left((4)^2 - \frac{1}{3}(4)^3\right) - (0)$

$-\frac{16}{3}$

c/ $y = 2x - x^2$

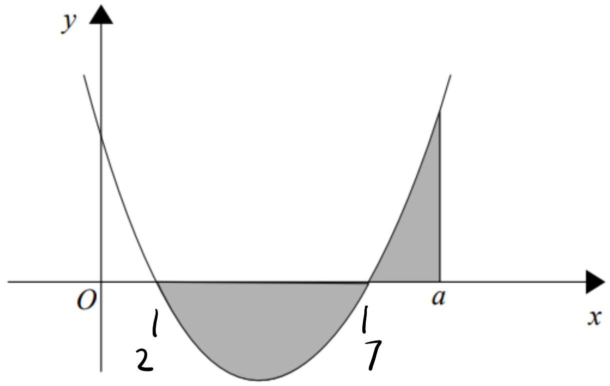
$= x(2 - x)$



· between 0 and 4 some of the area is above and some below the x axis.

· the answer will be the difference between the two areas.

32



The diagram shows the curve with equation $y = x^2 - 9x + 14$ and the line $x = a$

Given the total area of the two shaded regions is 29 units^2
Find the exact value of a.

crosses x when $y = 0$

$$0 = x^2 - 9x + 14$$
$$0 = (x-2)(x-7)$$
$$x = 2 \qquad x = 7$$

$$\int_2^7 x^2 - 9x + 14 \, dx = \underline{\frac{125}{6} \text{ units}^2}$$

$$29 - \frac{125}{6} = \frac{49}{6} \text{ units}^2$$

$$\int_7^a x^2 - 9x + 14 \, dx = \frac{49}{6}$$

$$\left[\frac{1}{3}x^3 - \frac{9}{2}x^2 + 14x\right]_7^a = \frac{49}{6}$$

$$\left(\frac{1}{3}a^3 - \frac{9}{2}a^2 + 14a\right) - \left(\frac{1}{3}(7)^3 - \frac{9}{2}(7)^2 + 14(7)\right) = \frac{49}{6}$$

$$\frac{1}{3}a^3 - \frac{9}{2}a^2 + 14a = 0$$

$$a\left(\frac{1}{3}a^2 - \frac{9}{2}a + 14\right) = 0$$

$$a = 0 \qquad a = \underline{\underline{\frac{27+\sqrt{57}}{4}}} \qquad a = \frac{27-\sqrt{57}}{4}$$

a must be > 7
$\therefore a = \frac{27+\sqrt{57}}{4}$

33 Find $\int \left(10 - \frac{6}{x^2}\right) \mathrm{d}\, x$

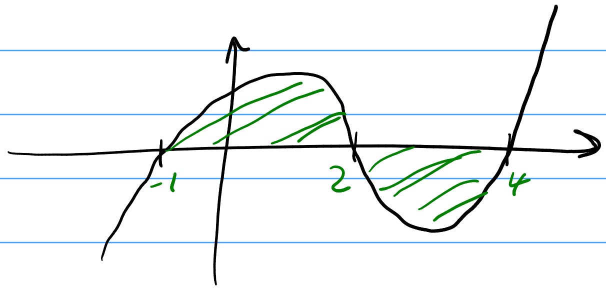
writing your answer in its simplest form.

$$\int 10 - 6x^{-2} \; dx$$

$$\underline{\underline{10x + 6x^{-1} + C}}$$

34 $f(x) = (x-4)(x-2)(x+1)$

Find the area enclosed by $f(x)$ and the x-axis

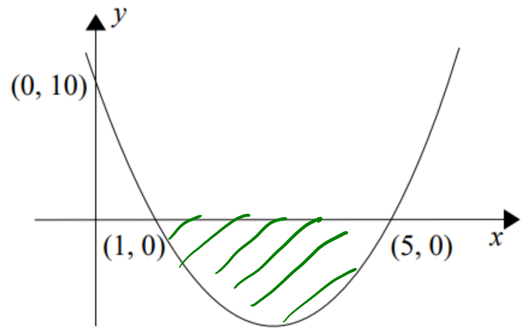


$$\int_2^4 (x-4)(x-2)(x+1)\; dx = -\frac{16}{3}$$

$$\int_{-1}^{2} (x-4)(x-2)(x+1)\; dx = \frac{63}{4}$$

$$\frac{16}{3} + \frac{63}{4} = \underline{\underline{\frac{253}{12} \text{ units}^2}}$$

35



The sketch shows a quadratic graph that passes through (0, 10), (1, 0) and (5, 0)

Find the area of the finite region bounded by the curve and the x-axis.

$y = k(x-1)(x-5)$ $\quad (0, 10)$

$10 = k(-1)(-5)$

$k = 2$

$\int_1^5 2(x-1)(x-5)\, dx$

$\frac{64}{3}$ units^2

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36 Show that $\int_1^8 \left(\frac{16}{x^2}\right) dx = 14$

$\int_1^8 16x^{-2}\, dx$

$\left[-16x^{-1}\right]_1^8$

$-16(8)^{-1} - -16(1)^{-1}$

$-2 + 16$

14

37 Show that $\int_1^4 (1 + 3\sqrt{x})\, dx = 17$

$$\int_1^4 1 + 3x^{\frac{1}{2}} \quad dx$$

$$\left[x + 2x^{\frac{3}{2}} \right]_1^4$$

$$\left(4 + 2(4)^{\frac{3}{2}}\right) - \left(1 + 2(1)^{\frac{3}{2}}\right)$$

$$20 - 3$$

$$\underline{\underline{17}}$$

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38 (a) Find $\int x^2 \left(2x + \frac{25}{\sqrt{x}}\right) dx$

(b) Find $\int_1^9 x^2 \left(2x + \frac{25}{\sqrt{x}}\right) dx$

a/ $$\int x^2 \left(2x + 25x^{-\frac{1}{2}}\right) \quad dx$$

$$\int 2x^3 + 25x^{\frac{3}{2}} \quad dx$$

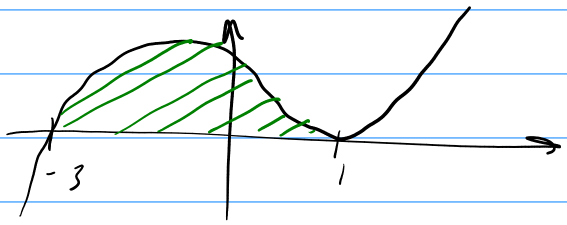
$$\underline{\underline{\frac{1}{2}x^4 + 10x^{\frac{5}{2}} + c}}$$

b/ $$\left[\frac{1}{2}x^4 + 10x^{\frac{5}{2}} \right]_1^9$$

$$\left(\frac{1}{2}(9)^4 + 10(9)^{\frac{5}{2}}\right) - \left(\left(\frac{1}{2}(1)^4 + 10(1)^{\frac{5}{2}}\right)\right.$$

$$\underline{\underline{5700 \text{ units}^2}}$$

39 Use integration to show that the area enclosed by x-axis and the curve with equation $y = (x + 3)(x - 1)^2$ is $\frac{64}{3}$ square units.



$$\int_{-3}^{1} (x+3)(x-1)^2 \, dx$$

$$(x+3)(x^2-2x+1)$$
$$x^3+3x^2-2x^2-6x+x+3$$
$$x^3+x^2-5x+3$$

$$\int_{-3}^{1} x^3+x^2-5x+3 \, dx$$

$$\left[\frac{1}{4}x^4+\frac{1}{3}x^3-\frac{5}{2}x^2+3x\right]_{-3}^{1}$$

$$\left(\frac{1}{4}(1)^4+\frac{1}{3}(1)^3-\frac{5}{2}(1)^2+3(1)\right)-\left(\frac{1}{4}(-3)^4+\frac{1}{3}(-3)^3-\frac{5}{2}(-3)^2+3(-3)\right)$$

$\frac{64}{3}$ units^2