Question 1 (11 marks) **Marks**

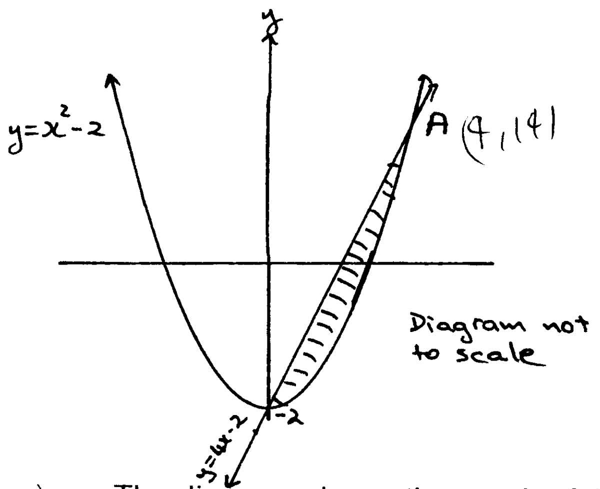
a) Find the primitive of $x^4 + \dfrac{1}{x^4}$ **2**

b) Evaluate $\displaystyle\int_0^1 (3x+2)^3\,dx$ **2**

c) "A bag contains red, green and yellow lollies. If I choose one of the lollies randomly from the bag, the probability that it is red is ⅓"

Is this a true or false statement?
Give a brief reason for your answer. **1**

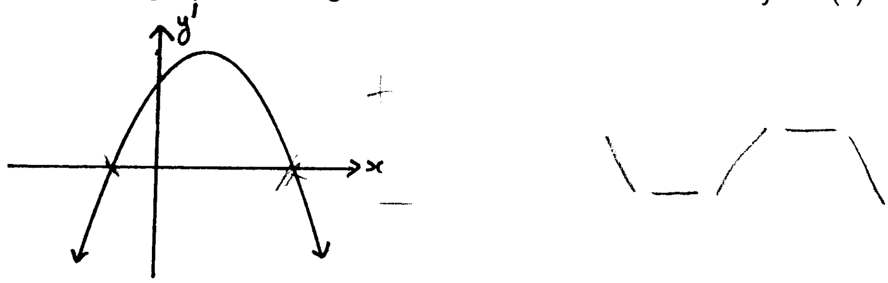
d) The graphs of $y = 4x - 2$ and $y = x^2 - 2$ are drawn below.



(i) Find the x coordinates of the point A. **1**

(ii) Find the area of the shaded region between $y = 4x - 2$ and $y = x^2 - 2$ **3**

e) The diagram shows the graph of the gradient function of the curve $y = f(x)$



Copy the diagram onto your answer paper.
On the same diagram and using a different colour pencil draw a possible sketch of $y = f(x)$ **2**

Question 2 (11 marks) **Marks**

a) $y = f(x)$

x	0	4	8
y	5	6	7

Use the trapezoidal rule and the table to find an approximation

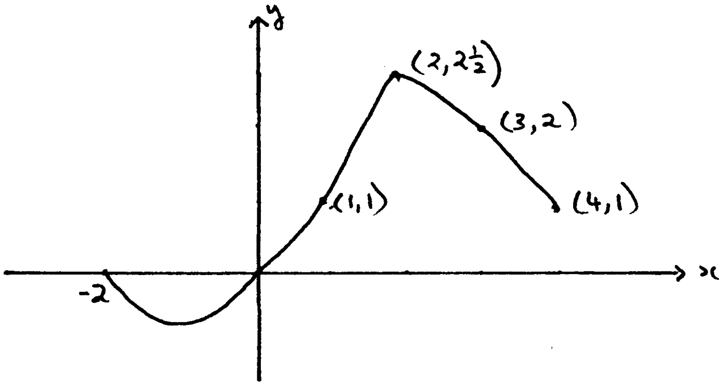
for $\int_0^8 f(x)\,dx$ **2**

b) Greg and Jack are playing each other in a golf tournament. They will play two rounds and each has an equal chance of winning the first round.
If Greg wins the first round, his probability of winning the second round is increased to 0.6.
If Greg loses the first round, his probability of winning the second round is reduced to 0.3.

(i) Draw a tree diagram for the two-round sequence. Label each branch of the diagram with the appropriate probability. **2**

(ii) Find the probability that Greg wins exactly one round. **2**

c)



This is the curve $y = f(x)$ for $-2 \le x \le 4$

(i) Write down an **expression** for the exact area bounded by the curve, the line x=4 and the x-axis.
(You are not required to find the equation of the curve.) **2**

(ii) Using the graph above copy and complete the following table onto your answer paper.

x	0	1	2	3	4
y=f(x)					

Use Simpson's rule with these 5 function values to approximate the area enclosed by the curve, the x axis and the lines x = 0 and x = 4. **3**

Question 3

Marks

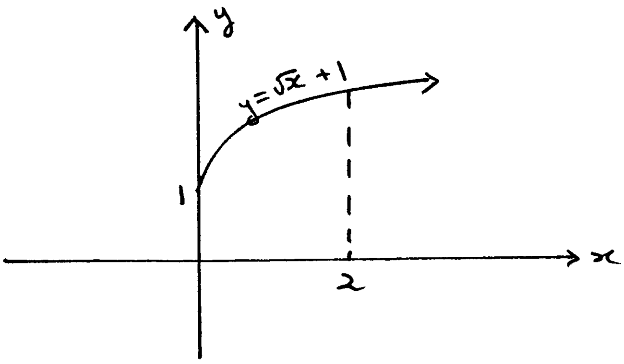
a) Find $\int \frac{dx}{2x^3}$ **2**

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

b) From a group of 5 boys and 6 girls, two are selected at random for a class committee. What is the probability that a boy and girl are selected? **2**

c) Show that the exact volume of the solid generated when the region bounded by $y = \sqrt{x} + 1$, $x = 0$, $x = 2$ is rotated about the x axis is:

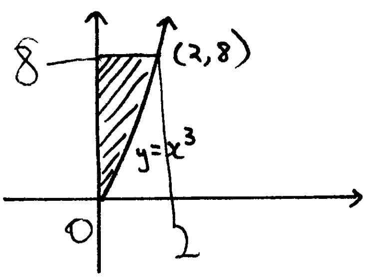
$$\pi\left(4 + \frac{8\sqrt{2}}{3}\right) \text{ units}^3$$ **3**



d) Frankbert and Prestholm are 2 netball teams.
The probability that Frankbert will win in any match with Prestholm is 70%. If the 2 teams meet on 3 occasions, what is the probability that Frankbert will win at least one of the games? **2**

W 70%
L 30%

e)



The curve $y = x^3$ is drawn. Write down 2 distinctly different expressions which would calculate the shaded area in the diagram. **2**

$y = x^3$

$x = \sqrt[3]{y}$

$2^{1/2} = \sqrt{2}$

ANSWERS

QUESTION 1

a) $\int x^4 + x^{-4}\,dx = \frac{x^5}{5} + \frac{x^{-3}}{-3} + c$

$= \frac{x^5}{5} - \frac{1}{3x^3} + c$

b) $\int_0^1 (3x+2)^3\,dx = \left[\frac{(3x+2)^4}{12}\right]_0^1$

$= \frac{(5)^4}{12} - \frac{(2)^4}{12}$

$= \frac{625}{12} - \frac{16}{12}$

$= \frac{609}{12}$

$= 50\frac{3}{4}$

c) False. May be more of one colour than another.

d) i) $x^2 - 2 = 4x - 2$

$x^2 - 4x = 0$

$x(x-4) = 0$

$x = 0, 4$ $\quad \therefore$ A has x coordinate 4

ii) $A = \int_0^4 (4x-2)\,dx - \int_0^4 (x^2-2)\,dx$

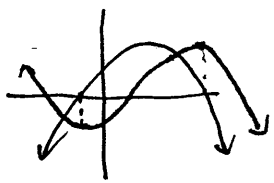
$= \left[\frac{4x^2}{2} - 2x\right]_0^4 - \left[\frac{x^3}{3} - 2x\right]_0^4$

$= \left[2(4)^2 - 2(4) - 0\right] - \left[\frac{4^3}{3} - 2(4) - 0\right]$

$= 24 - 13\frac{1}{3}$

$= 10\frac{2}{3}$ units^2

e)

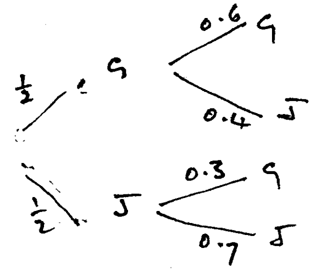


QUESTION 2

a) $\int_0^8 f(x)\,dx = \frac{4}{2}\left(5 + 2(6) + 7\right)$

$= 48$

b)



ii) $P(GJ)$ or $P(JG) = 0.5 \times 0.4 + 0.5 \times 0.3$

$= 0. + 0.15$

$= 0.35$

c) $A = \left|\int_{-2}^{0} f(x)\,dx\right| + \int_0^4 f(x)\,dx$

ii)

x	0	1	2	3	4
$f(x)$	0	1	$2\frac{1}{2}$	2	1

$A = \frac{1}{3}\left\{0 + 1 + 4(1+2) + 2(2\tfrac{1}{2})\right\}$

$= \frac{1}{3}(18)$

$= 6$

QUESTION 3

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

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

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

b) $P(GB)$ or $P(BG) = \frac{6}{11} \times \frac{5}{10} + \frac{5}{11}\times\frac{6}{10}$

$= \frac{60}{110}$

$= \frac{6}{11}$

c) $V = \pi \int y^2\,dx$

$= \pi \int_0^2 (x + 2x^{1/2} + 1)\,dx$

$= \pi \left[\frac{x^2}{2} + \frac{2x^{3/2}}{3/2} + x\right]_0^2$

$= \pi \left[\left(2 + \frac{4(2)^{3/2}}{3} + 2\right) - 0\right]$

$= \pi \left[4 + \frac{8\sqrt{2}}{3}\right]$ units^3

$y = \sqrt{x} + 1$

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

$= x + 2\sqrt{x} + 1$

$= x + 2x^{1/2} + 1$

d) $P(\text{F win at least one}) = 1 - P(PPP)$

$= 1 - \left(\frac{30}{100}\right)^3$

$= 0.973$.

e) $A = 16 - \int_0^2 x^3\,dx$

$A = \int_0^8 \sqrt[3]{y}\,dy$.