

M

- There are a tot
- Show all your  
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- You may use th  
work may be fo
- Do not remove

Question	1
Marks	5

1. (a) F  
(b) C

a)

b)  $\int_2^1$

2. If  $\int_3^5 f$

$$\int_3^5 f$$

$$\int_3^0 f$$

$\therefore$

3. Evaluate each

$$(a) \int \sin^5 \theta \, d\theta$$

$$= \int \sin^4 \theta \sin \theta \, d\theta$$

$$= \int \sin^3 \theta \sin^2 \theta \, d\theta$$

$$= \int \sin^2 \theta (1 - \cos^2 \theta) \, d\theta$$

$$= \int (1 - \cos^2 \theta) \sin^2 \theta \, d\theta$$

$$= \int (1 - \cos^2 \theta) (1 - \cos^2 \theta) \, d\theta$$

$$= \int (1 - 2\cos^2 \theta + \cos^4 \theta) \, d\theta$$

$$= \frac{1}{5} \theta^5 + C$$

$$(b) \int_0^1 x \arctan x \, dx$$

By P

$$\left[ \frac{1}{2} x^2 \arctan x \right]$$

$$= \left[ \frac{1}{2} (1)^2 \arctan 1 \right]$$

$$= \frac{\pi}{8}$$

$$= \frac{\pi}{8}$$

$$= \frac{\pi}{8}$$

3. (contin

(c)  $\int$

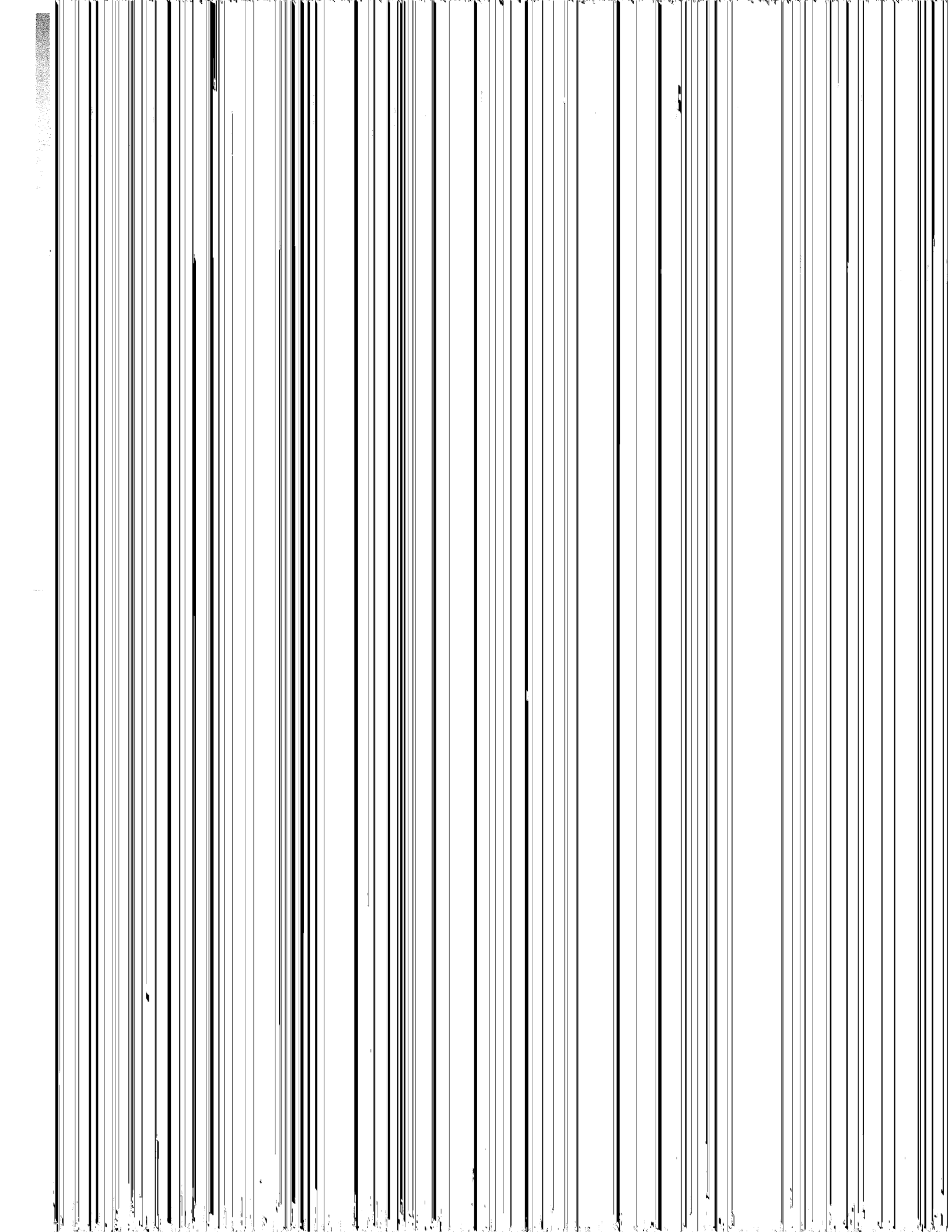
$$= \int$$

$$= \int \left( \frac{1/q}{x} \right)$$

$$= \frac{1}{q} \ln|x|$$

$$\boxed{\frac{1}{q} \ln}$$

11 11 0 11



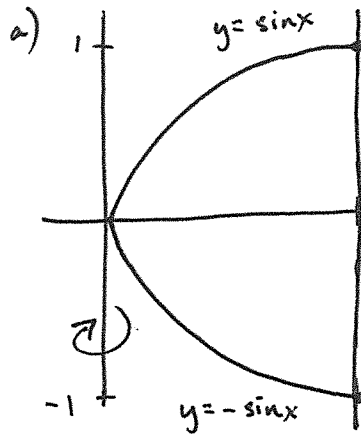
6. Let  $\mathcal{R}$  be the region bound

(a) [3+3 marks] Set up

i. by using the "shell

ii. by using the "disc

(b) Determine the volume



$$\begin{aligned} b) \quad V &= 4\pi \int_0^{\pi/2} x \sin x \\ &= 4\pi \left[ -x \cos x \right]_0^{\pi/2} \\ &= 4\pi \left[ -\frac{\pi}{2} (0) + \right. \\ &= 0 + 4\pi \end{aligned}$$

7. Determ

(a)  $\int_1^2$

$$= \frac{1}{t}$$

$$= \frac{1}{t}$$

$$= \frac{1}{t}$$

$\therefore$

(b)  $\int_1^2$

$$= \frac{1}{t}$$

$$= \frac{1}{t}$$

$$= \frac{1}{t}$$

$$= 0$$

,



8. Find a pattern

Does the

$a_n$

$$-1 \leq s$$

$s$

9. Determine

$$\sum_{n=1}^{\infty}$$

Geo

10. Determine  
you are us

(a)  $\sum_{n=1}^{\infty} \frac{1}{n^2}$

$\frac{1}{n^2}$

(b)  $\sum_{n=1}^{\infty} 3^{-n}$

**I** Com

3-

$\Rightarrow \underline{3}$

**II** Lim

$\lim_{n \rightarrow \infty}$

=

10. (contin

$$(c) \sum_{n=0}^{\infty}$$

Rati

$$\lim_{n \rightarrow \infty}$$

$$\begin{aligned} &= \lim_{n \rightarrow \infty} \left| \frac{(-1)^{n+1}}{5^{n+1}} \right| \\ &= \lim_{n \rightarrow \infty} \frac{5^n}{5^{n+1}} \\ &= \lim_{n \rightarrow \infty} \frac{1}{5} \\ &= \lim_{n \rightarrow \infty} \frac{4n^2}{5n^2} \\ &= \lim_{n \rightarrow \infty} \frac{4}{5} \end{aligned}$$

absolutely c

11. Find the in

Ratio

$$\lim_{n \rightarrow \infty}$$

$$= \lim_{n \rightarrow \infty}$$

$$= (1)$$

Conver

If  $x$

$$\sum_{n=1}^{\infty}$$

If  $x =$

$$\sum_{n=1}^{\infty}$$

Since

$$\therefore \frac{1}{n^2}$$



13. Let  $f(x)$   
 $f(x), x =$

Suppose  
by revoh

$$4\pi$$

$$8\pi$$

$$S_c$$

$\Rightarrow$

$\Rightarrow$

$\therefore$