



FORENAME SURNAME	
STUDENT NO.	DEPARTMENT
SIGNATURE	TEACHER

1	2	3	TOTAL			
/20	/20	/20				
4	5					
/20	/20					/100

(You must show your working for all questions.)

1. [20 pts] Find the length of the curve

$$x = \frac{y^4}{4} + \frac{1}{8y^2}$$

from $y = 1$ to $y = 3$.

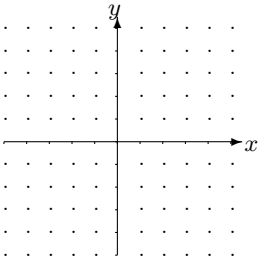
[p330 q5]

2. [20 pts] Find the area of the surface generated by revolving the curve

$$y = \sqrt{x}, \quad 3/4 \leq x \leq 15/4;$$

about the x -axis.

[p335 q14]



3. [20 pts] Given the function and its derivatives

$$y = \frac{x^2 + 1}{x - 1}, \quad y' = \frac{x^2 - 2x - 1}{(x - 1)^2}, \quad y'' = \frac{4}{(x - 1)^3} :$$

[p96 q100]

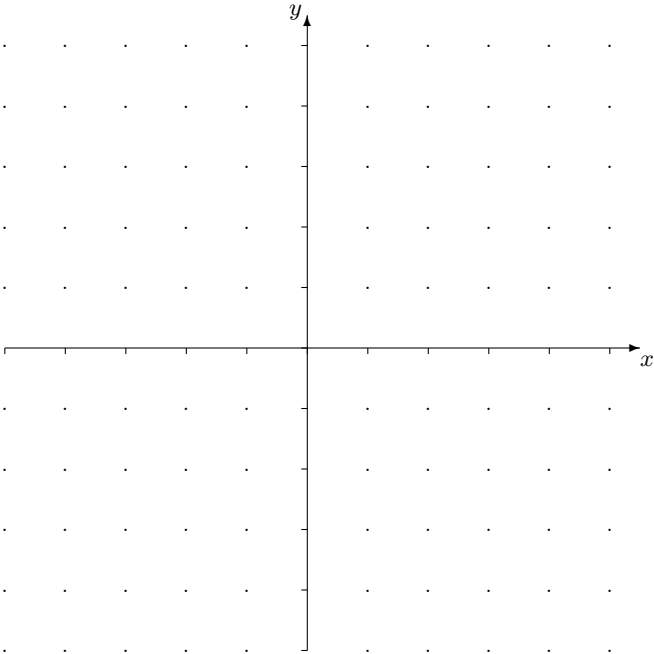
(a) Find all the asymptotes.

(b) Find its intervals of increase and decrease.

(c) Find all the points of inflection and the intervals where it is concave up and concave down.

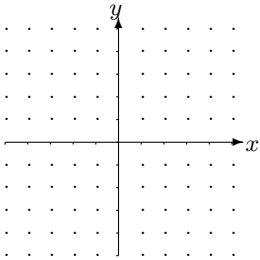
(d) Sketch its graph on the axes below. (Label all the significant details. The following table might be of help.)

x	
y'	
y''	
y	

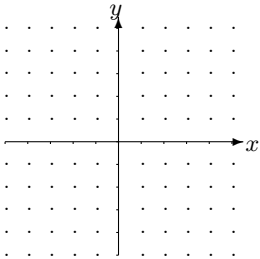


4. [20 pts] Set Up but DO NOT EVALUATE the integrals which give the volume of the solid generated by revolving the region bounded by $y = x^3, y = 8, x = 0$. [p325 q24]

(a) about the y -axis



(b) about the x -axis



5. [20 pts] Evaluate the following integrals:

(a) $\int t^3(1 + t^4)^3 dt$ [p290 q37]

(b) $\int \sin^5 \frac{x}{3} \cos \frac{x}{3} dx$ [p290 q25]