Unit 8 Review

1. The values of a function are given in the table

X	0	1	2	3	4	5	6
F(x)	1	2	3	4	6	7	10

Function F(x) is a differentiable function and selected values are stated above.

A) Approximate the value of $\int_0^6 F(x)dx$ using a midpoint Riemann sum of 3 equal subintervals.

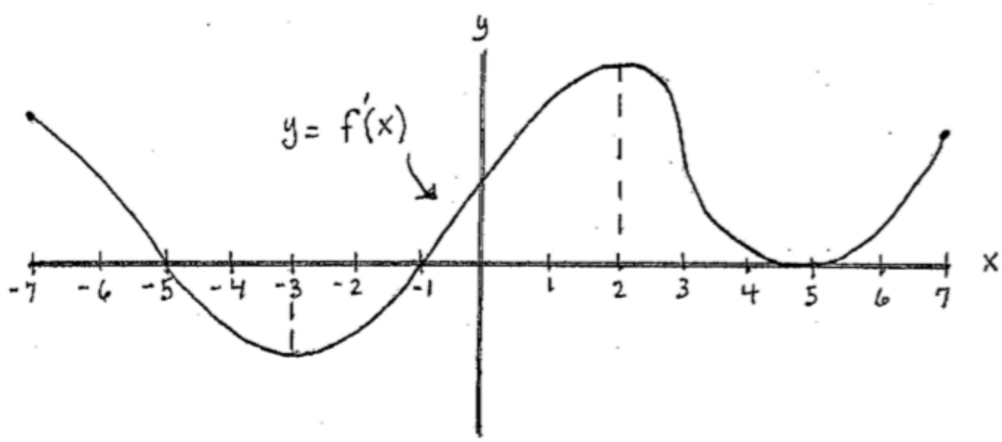
B) Approximate the average value of $F(x)$ on $[0,6]$ using a Right Hand Riemann sum with 3 equal subintervals.

C) Approximate the value of $\int_2^5 F(x)dx$ using a trapezoidal sum of 3 equal subintervals.

D) Suppose that the line tangent to *F(x)* at x = 4 is given by $y = \frac{7}{2}x - 8$.

Find $\lim\limits_{x\to 4} \frac{F(x)-2x+2}{2-\sqrt{x}}$ or explain why it does not exist.

2. Cat #



The figure above shows the graph of f ′, the derivative of the function , f, for -7<x<7. The graph of f ′ has horizontal tangent lines at x = - 3, x = 2, and x = 5, and a vertical tangent line at x = 3.

A) Find all values of x , for –7 < x < 7 , at which f attains a relative minimum. Justify With a labeled number line and sentence.

B) Find all values of x , for –7 < x < 7 , at which f attains a relative maximum. Justify With a labeled number line and sentence.

C) Find all values of x , for –7 < x < 7 , at which f ″ (x) < 0 . Justify With a sentence.

D) At what values of x, for -7 ≤ x ≤ 7, does f attain its absolute maximum. Justify with A sentence.

3. Region R is bounded by y = ln x, x = 1, x = 4, y = 0

A) Sketch, label, and shade Region R

B) Find Area of Region R

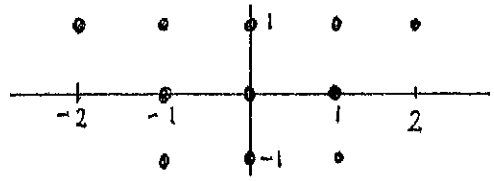
C) Find Volume of the solid obtained by rotating Region R about the y-axis. Sketch region. Use integration by parts to solve.

D) Find Volume of the solid obtained by rotating Region R about the line y = 3. Set up only – do not solve. Sketch region.

Cat # 13

4. Consider the differential equation $\frac{dy}{dx} = x\,(y-1)^2$

A) Sketch the slope field for the given differential equation at the eleven points indicated



B) Separate the differential equation - y's with the dy on one side of the equation and x's with the dx on the other side.

C)

Find the particular solution with the initial condition $f(0) = -1$
Simplify final solution to have no complex fractions

D) Find the range of the function found in part (C) Use L"Hopitals Rule to find solution

Cat # 12/4

5. A) Solve by Integration by Parts : $\int x\, e^{-3x}\, dx$

B) Use L"Hopitals Rule to find limit: $\lim_{x \to 1} \frac{\ln(x)}{2x-2}$

C) $y = \sec^{-1}(x^4)$
Find y'

D) $y = \tan^{-1}(x^3)$
Find y'

E) $\int \frac{x}{9 + x^4}\, dx$

F) Solve by Integration by Parts: $\int_1^2 x \ln(x)\, dx$

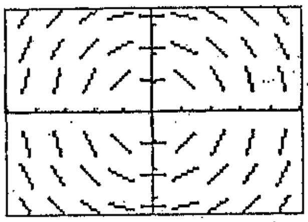
6. Cat#

Slope Fields

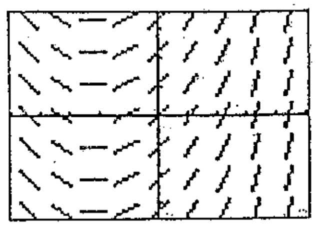
(6)

Match the slope fields with their differential equations.

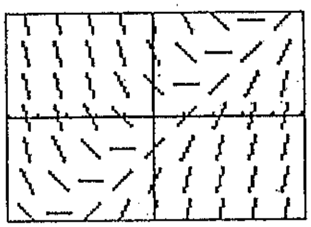
(A)



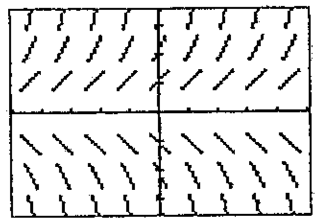
(B)



(C)



(D)



1) $\frac{dy}{dx} = \frac{1}{2}x + 1$

2) $\frac{dy}{dx} = y$

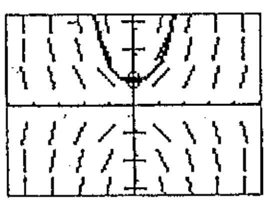
3) $\frac{dy}{dx} = x - y$

4) $\frac{dy}{dx} = -\frac{x}{y}$

E) The calculator drawn slope field for the differential equation $\frac{dy}{dx} = xy$ is shown in the figure below. The solution curve passing through the point (0, 1) is also shown.

(a) Sketch the solution curve through the point (0, 2).

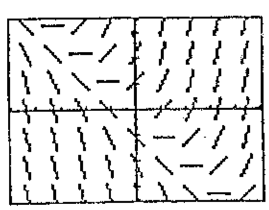
(b) Sketch the solution curve through the point $(0, -1)$.



F) The calculator drawn slope field for the differential equation $\frac{dy}{dx} = x + y$ is shown in the figure below.

(a) Sketch the solution curve through the point (0, 1).

(b) Sketch the solution curve through the point $(-3, 0)$.



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