Math 126
Fall 2022
Dr. Lily Yen

Test 1

Show all your work

Name: _____
Number: _____
Signature: _____
Score: ___/35

No Calculator permitted in this part. Read the questions carefully. Show all your work and clearly indicate your final answer. Use proper notation.

Problem 1: Integrate the following. Use correct notation and show all steps.

a. $\int \sqrt[3]{u}(u+1)^2\,du$

Score: /2

b. $\int \frac{\cos(x)}{\sqrt{4-\sin^2(x)}}\,dx$

Score: /2

c. $\int \frac{\ln(\sin(\theta))}{\tan(\theta)}\,d\theta$

Score: /2

d. $\int \frac{t-2}{3t^2+1}\,dt$

Score: /3

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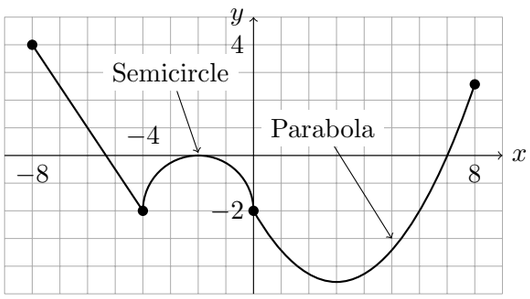
A TI83 or TI84 Calculator permitted in this part. Read the questions carefully. Show all your work and clearly indicate your final answer. Use proper notation.

Problem 2: Given the graph of f, evaluate the following integrals exactly.



a. $\displaystyle\int_{-8}^{-4} f(x)\,dx$

b. $\displaystyle\int_{-4}^{0} |f(x)|\,dx$

c. $\displaystyle\int_{-8}^{0} |f(x)|\,dx$

d. Draw R_8 over $[-8, 8]$ directly on the grid. Lightly shade the rectangles.

Score: /6

Problem 3: Give a function g that has the following expression as a left Riemann sum when $n = 10$, $\Delta x = 3$, and the left end point of the closed interval is -4:

$$\sum_{k=0}^{9} \frac{1}{6k-2}$$

Score: /3

Problem 4: Given the function $f(u) = |u^2 - u - 6|$, answer the following questions.

a. First draw f on the interval $[-4, 4]$, then draw R_4 for f on the same coordinate system.

b. Compute exactly R_4 on the interval $[-4, 4]$ by listing the area for each rectangle.

c. Use your graphing calculator to fill the following table for the interval, $[-4, 4]$. Provide at least 2 decimal places.

Approx	$n = 10$	$n = 100$
L_n		
R_n		

Score: /5

Problem 5: Suppose the number of hours of daylight on a given day in North Vancouver is modelled by $-4.1\cos(\frac{\pi t}{6}) + 12.5$, where t is given in months and $t = 0$ corresponds to the winter solstice. Answer the following.

a. Find the average number of daylight hours in a year.

b. Find the times t_1 and t_2 in a year where the number of daylight hours equal the average number.

Score: /4

Problem 6: Use the Fundamental Theorem of Calculus to find the following.

a. If $F(x) = \int_{3\sqrt{x}}^{\pi} 2t\,dt$, find $F'(4)$ exactly.

Score: /2

b. If $G(x) = \int_{\tan(\pi/4)}^{\ln(x)} \pi \tan^{-1}(t) + 2e^t\,dt$, find $dG(x)/dx$.

Score: /2

Problem 7: The following table shows the change in historic average cost per gigabyte of RAM on a computer over 5-year increments from 1980 to 2010.

Year	1980	1985	1990	1995	2000	2005	2010
5-Year Change ($)	0	−5 468 750	−755 495	−73 005	−29 768	−918	−177

The table shows that the average cost per gigabyte of RAM in 1985 dropped almost 5.5 million dollars compared to that of 1980. Answer the following questions.

a. If the average cost per gigabyte of RAM in 2010 is $12, find the average cost per gigabyte of RAM in 2000.

b. The average cost per gigabyte of RAM can be approximated by the function $C(t) = 6.5(0.65)^t$ where t is measured in years since 1980 and C is cost in millions of dollars (US). Find the average cost per gigabyte of RAM from 1980 to 2010.

Score: /4