IŞIK UNIVERSITY, MATH 101 FINAL EXAM

Exam Duration: 1 hr. and 45 min.	**Q1**		**Q2**		**Q3**		Row No:
Last Name:		First Name:				Student ID:	

Q.1. (10 pt) Find the derivative of the function $f(x) = \sqrt{x}$ by using the definition of derivative (No other methods will be excepted.).

Q.2 (8 pt) Evaluate the integral:

$$\int_1^4 \frac{dx}{1 + \sqrt{x}}$$

Q.3 (12 pt) Given the function

$$f(x) = \begin{cases} \dfrac{1}{x} & \text{if } x < -1 \\ \cos(\pi x) & \text{if } -1 \leq x < 2 \\ \sqrt{x-1} & \text{if } 2 \leq x \leq 5 \\ x^2 - 4x & \text{if } x > 5. \end{cases}$$

a. Is f continuous at $x = -1$? Explain why?

b. Is f continuous at $x = 2$? Explain why?

c. Is f continuous at $x = 5$? Explain why?

Department of Mathematics, Işık University

IŞIK UNIVERSITY, MATH 101 FINAL EXAM

Exam Duration: 1 hr. and 45 min.	**Q4**		Row No:	
Last Name:		First Name:		Student ID:

Q4. (18 pt) Given the function $f(x) = \dfrac{2x + 1}{x - 1}$.

    a. Find the domain of f.

    b. Find x- and y-intercepts.

    c. Find all critical points.

    d. Determine the intervals on which f is decreasing or increasing.

    e. Determine the intervals on which f is concave up or down.

    f. Find asymptotes.

    g. Graph $f(x)$ using information obtained (a)-(g). (Show details clearly on the graph to receive full credit.)

IŞIK UNIVERSITY, MATH 101 FINAL EXAM

Exam Duration: 1 hr. and 45 min.	**Q5**		Row No:	
Last Name:		**First Name:**		**Student ID:**

Q5. (13 pt) By using limits, find the vertical, horizontal, and oblique asymptotes of the function $f(x) = \dfrac{x^2 - 1}{x - 3}$, if any.

IŞIK UNIVERSITY,   MATH 101 FINAL EXAM

Exam Duration: 1 hr. and 45 min.	**Q6**		Row No:
Last Name:	**First Name:**		**Student ID:**

Q6. (14 pt) Find the function $f(x)$ whose derivative is $f'(x) = 3\cos^2 x$ and that satisfies $f(0) = \dfrac{\pi}{8}$.

IŞIK UNIVERSITY,   MATH 101 FINAL EXAM

Exam Duration: 1 hr. and 45 min.	**Q7**		**Q8**		**Q9**		Row No:
Last Name:		First Name:			Student ID:		

Q.7 (15 pt) Find the area of the region bounded by the curves $x = y^2 + 1$, $x = 0$, $y = 0$ and $y = 1$.

Q.8 Evaluate the integrals:

a. (5 pt) $\int \dfrac{1}{x^2} \cos \left(1 + \dfrac{1}{x} \right) \ dx$

b. (5 pt) $\int \dfrac{e^{2x}}{(1 + e^x)^{1/3}} \ dx$

Q.9 (Bonus, extra 10 pt) Evaluate the limit:

$$\lim_{x \to \pi} \frac{\displaystyle\int_\pi^x \frac{1}{2 + \cos t} \, dt}{x - \pi}$$