

PRINCE SULTAN UNIVERSITY

MATH 111

Calculus

MAJOR EXAM 1

Start : **4:00 pm**

End: **5:30 pm**

Name _____

I.D. _____

Section: (8 AM)

(10 A.M)

(11 AM)

(12 PM)

1. Answer all questions
2. This exam consists of 6 pages, 11 questions
3. You can use a calculator, NOT a mobile phone.
4. No talking during the test.
5. Show all working out in the space provided.

Question No.	Max. Points	Points Scored
1,2,3, 4	15	
5,6, 7, 8, 9	19	
10, 11	16	
TOTAL	50	

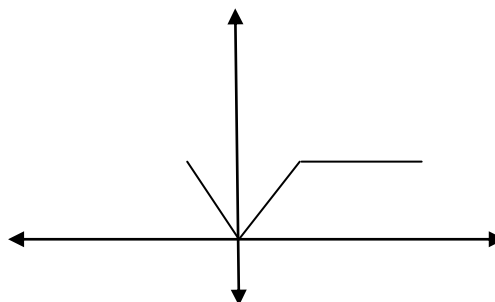
Q1. (3 Points) Evaluate the difference quotient $\frac{f(x)-f(1)}{x-1}$ for the function $f(x) = \frac{2}{x+1}$

Q2. (6 Points) Find the domain of the following functions

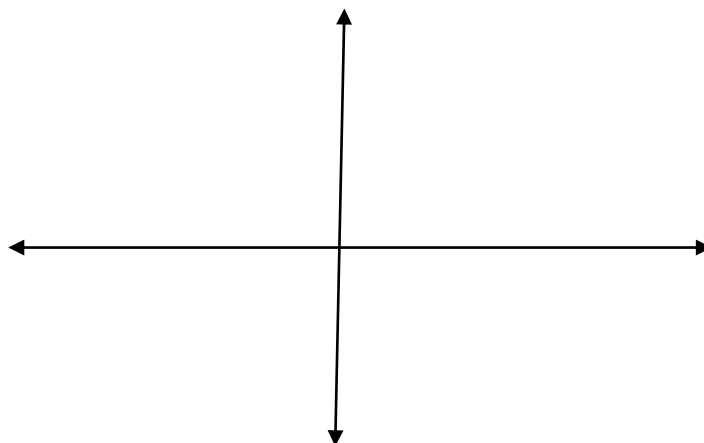
a. $f(x) = \sqrt{1 + \ln x}$

b. $f(x) = \sin^{-1}(3x - 2)$

Q3. (3 Points) Find an expression for a function whose graph is shown below



Q4. (3 Points) Graph the function $f(x) = |x| - x$



Q5. (3 Points) Show that the function $f(x) = \frac{1-e^x}{1+e^x}$ is odd

Q6. (3 Points) Use the graph of $g(x) = \sqrt{x}$ to graph the function $f(x) = |\sqrt{x} - 1|$



Q7. (4 Points) Let $f(x) = \sqrt{x}$ and $g(x) = \sqrt[3]{1-x}$. Find the following:

a. $f \circ g(x)$

b. $g \circ g(x)$

Q8. (6 Points) Show that the function $f(x) = 1 + \sqrt{3+x}$ is 1-1 and find its inverse.

Q9. (3 Points) Show that the equation $2 + 2 \sin x = e^x$ has a solution in the interval $(-1, 1)$

Q10. (12 Points) Evaluate the limit

a. $\lim_{x \rightarrow 1} \frac{x^2 - x}{x^2 + 3x - 4}$

b. $\lim_{x \rightarrow -4} \frac{\sqrt{x+8} - 2}{x+4}$

c. $\lim_{x \rightarrow 1} \sqrt{x-1} e^{\sin(\frac{3}{x-1})}$

d. $\lim_{h \rightarrow 0} \frac{(-3+h)^2 - 9}{h}$

Q11. (4 Points) Study the continuity of the function $f(x) = \begin{cases} \sin x & \text{if } x \leq 0 \\ 1 - x^2 & \text{if } x > 0 \end{cases}$ at $x = 0$