Instructions: Keep all devices capable of communication turned off and out of sight.**Multiple Choice Questions (44 points)**

Q1 Suppose that $f(x) = |x+2|$ and the domain of f is $(-\infty, -2]$. Find $f^{-1}(2)$.

(A) -5 | (C) -2 | (E) None

(B) -4 | (D) 1

Q2 Let $A = \{a, b, c, d\}$ and $B = \{1, 2\}$ be finite sets. How many functions are there from A to B?

(A) 16 | (C) 81 | (E) None

(B) 32 | (D) 12

Q3 $\lim_{x\to 0} \dfrac{\sin x}{\sqrt{x}}$ is

(A) -1 | (C) 1 | (E) None

(B) 0 | (D) π

Q4 Suppose $f(x) = \frac{1}{x^2-25}$. What is the largest value of A such that $f(x)$ is defined on the interval $[-10, A)$?

(A) 5 | (C) -2 | (E) None

(B) $2\sqrt{6}$ | (D) -5

Q5 If $f(x) = |x+2|$ then find $\lim_{x\to -2} \dfrac{f(x) - f(-2)}{x+2}$

(A) 4 | (C) 0 | (E) DNE

(B) 1 | (D) 2

Q6 $\lim_{x\to 0} \dfrac{\tan x - x}{\sin x}$ is

(A) 2 | (C) π | (E) None

(B) $-\pi/2$ | (D) 0

Q7 $\lim_{x\to \infty} \dfrac{5 + 7^x}{2 + 9^x}$

(A) ∞ | (C) 5/2 | (E) None

(B) 0 | (D) 7/9

Q8 The equation of the slant (or oblique) asymptote to the graph of $f(x) = \dfrac{x^3+1}{x^2+1}$ is

(A) $y = -x$ | (C) $y = -x + 1$ | (E) None

(B) $y = x + 1$ | (D) $y = x$

Q9 Let $\dfrac{1}{3}x + \dfrac{3}{x} + 1 \le f(x) \le x^2 - 4x + 6$. Find the $\lim_{x\to 3} f(x)$

(A) -1 | (C) 2 | (E) 11

(B) 0 | (D) 3

Q10 Find the vertical(VA) and horizontal(HA) asymptotes of the function $f(x) = \dfrac{x^2+5x+6}{x^2-4}$.

(A) $VA: x = \pm 2, \quad HA: y = 1$ | (C) $VA: x = 2, \quad HA: y = 1$

(B) $VA: x = -2, \quad HA: y = 1$ | (D) None

Q11 $\lim_{x\to e}[\tan^{-1}(\ln x)]$

(A) ∞ | (C) $\pi/4$ | (E) None

(B) π | (D) $-\infty$

True/False questions(16 pts) . No justifications are needed.

Q12 A circle can be the graph of a function.

T F

Q13 If $f(x) = 7 - x + e^{x-2}$. Then $f^{-1}(6) = 2$.

T F

Q14 If $\lim_{x\to\infty} f(x)$ exists, then $f(x)$ must have a horizontal asymptote.

T F

Q15 If both $f(x)$ and $g(x)$ are odd functions, then their product $f(x)g(x)$ is an even function

T F

Find the following limits. If a limit does not exist, state does not exist and provide a brief explanation. Show all work. No work=No credit(40 pts) .

Q1(20pts) $\lim_{x\to 0} \frac{\frac{1}{x+7} - \frac{1}{7}}{x}$.

Solution.

Q2(20pts $\lim_{x\to 0} \frac{\sin x + 1 - \cos x}{x}$.

Solution.