M121 Fall 95 | Exam I | Sept. 15, 1995

Name (Print) ________________________________ SSN: ____________________

Circle the name of your TA and Discussion Hour:
David Krebes 9 AM 11 AM

Qihui Liu: 8am 9am

Jukun Ying 9am 11 am

Answer all questions and **SHOW ALL WORK**. No credit for answers only.

Part I: Multiple choice. No partial credit but SHOW WORK! Circle the letter corresponding to the correct answer.

1. A correct expression for the distance between the two points $(x, 5)$ and $(3, 9)$ is:

(A) $\sqrt{(x-5)^2 + (3-9)^2}$

(B) $\sqrt{x^2 - 5^2 + 3^2 - 9^2}$

(C) $\sqrt{x^2 - 6x + 25}$

(D) $|x-5| + |3-9|$

(E) $(x-3)^2 + (9-5)^2$

2. If $\sec\theta = 13/5$ and $3\pi/2 < \theta < 2\pi$, what is $\sin(\theta)$?

(A) $5/13$

(B) $12/13$

(C) $-12/13$

(D) $-13/5$

(E) 67.38^o

3. What is the period of $\tan(\pi/2 - x)$?

(A) $\pi/2$

(B) 2π

(C) π

(D) $\pi/4$

(E) 3

4. Determine $f(x) \circ g(x)$ if $f(x) = (2x-3)/4$ and $g(x) = x^2 - 2$. (Remember: $f \circ g$ means "Do g first".)

(A) $(2x^2 - 7)/4$

(B) $(4x^2 - 12x - 23)/16$

(C) $(2x^3 - 6x^2 - 4x + 6)/4$

(D) $(x^2 + 2x - 5)/4$

(E) $(2x^2 - 3)/4$

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5. Determine $g(x) \circ f(x)$ if $f(x) = (2x-3)/4$ and $g(x) = x^2 - 2$.

(A) $(2x^2 - 7/4$

(B) $(4x^2 - 12x - 23)/16$

(C) $(2x^3 - 6x^2 - 4x + 6)/4$

(D) $(x^2 + 2x - 5)/4$

(E) $(2x^2 - 3)/4$

6. A car whose tires have a diameter of 16 inches is pushed 10 feet down the driveway. How many times does each wheel rotate?

(A) 7.48

(B) 856.8

(C) 2.39

(D) 120 inches

(E) 160 inches

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7. The graph of $y = x^2$ is transformed in the following order:
    1. stretch VERTICALLY by a factor of 3
    2. shift RIGHT by 0.8 units
    3. shift UP by 1.3 units

The resulting graph is the graph of the function

(A) $y = (3x - 0.8)^2 + 1.3$

(B) $y = 3(x - 0.8)^2 + 1.3$

(C) $y = 3(x + .8)^2 + 3.9$

(D) $y = 3(x - 0.8)^2 + 3.9$

(E) $y = (3x + 1.6)^2$

Part II : (Partial credit) Write complete solutions and indicate your answers clearly.

8. Consider the function $f(x) = 15 \sec x$. (The calculator may not be helpful for the first four parts of this problem.)

   Give the domain: ______________.

   Give the range: ______________.

   Give the period: ______________.

   Describe all vertical asymptotes: ______________.

   Sketch the graph for x in the interval $[0, 2\pi]$. Be sure to label the coordinates of all x-intercepts and all y-intercepts. Draw and label all vertical asymptotes using a dotted line. Clearly indicate the scale on each axis.

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9. The angle of elevation of the top of a building from a point 50m away from the building is 58°. Determine the building's height.

Ans:____________________

10. Among the rectangles with perimeter 100 find the length and width of the one with the maximum area.

Ans:____________________

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11. Let

$$f(x) = \begin{cases} -x, & \text{if } 0 \le x < 5 \\ \sqrt{x-4}, & \text{if } x \ge 5. \end{cases}$$

What is the domain of f?

Ans:____________________

What is the range of f?

Ans:____________________

Sketch a complete graph of this function.

12.

The function $f(x)$ in the following graph is periodic with period less than 4π.

What is the period of the function?

Ans:____________________

What is its domain?

Ans:____________________

What is the maximum value of f?

Ans:____________________

What is the minimum value of f?

Ans:____________________

What is its amplitude?

Ans:____________________

What is a function that could have this graph?

Ans:____________________