M121 Fall 95 Exam I Sept. 15, 1995

Name (Print) ______________________________ SSN: ____________________

Circle the name of your TA and Discussion Hour:
David Krebes 8 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 wheel with a diameter of 15 inches revolves through 720^0 degrees. About how far has the wheel moved.

(A) 47 inches

(B) 60 inches

(C) 94 inches

(D) 188 inches

(E) 377 inches

2. Solve *exactly* $|x-5|>3$:

(A) $(8,\infty)$

(B) $(2,8)$

(C) $(-\infty,2)\cup(8,\infty)$

(D) $(\infty,1.93)\cup(8.06,\infty)$

(E) $(-\infty,-8)\cup(2,\infty)$

3. Let θ be an angle in the third quadrant whose terminal side is given by the equation $y = x/2$. What is $\cos\theta$?

(A) $\frac{\sqrt{5}}{5}$

(B) $\frac{2\sqrt{5}}{5}$

(C) $\frac{-2\sqrt{5}}{5}$

(D) $\frac{\sqrt{3}}{2}$

(E) $\frac{-\sqrt{3}}{2}$

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4. The angle of elevation of the top of a building from a point 50m away from the building is $53°$. Determine the building's height.

(A) 66.4m

(B) 40m

(C) 30.1m

(D) .03m

(E) .01m

5. The graph of $y = 2\sin(3x - \pi)$ can be obtained from the graph of $y = \sin x$ by applying in order the following three transformations.

   1. vertical stretch by a factor of a.
   2. horizontal shrink by a factor of b units.
   3. horizontal shift of c units left or right.

   What are the values of a, b, c and in which directions is the shift?

(A) $a = 2, b = 3, c = \pi$ left

(B) $= 2, b = 3, c = \pi/3$ right

(C) $a = 3, b = 2, c = \pi$

(D) $a = 2, b = 3, c = \pi/3$ left

(E) $a = 2, b = 3, c = \pi$ right

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

6. The vertices of a triangle are located as follows. Vertex A is at the origin. Vertex B is the intersection of the line $y = x$ and the parabola $y = -x^2 + x + 1$. Vertex C is the point on the x-axis directly below B. Find the area of the triangle. Your solution must include a diagram locating the vertices of the triangle.

Ans:________________

7. Find exactly all real zeros of the polynomial $f(x) = 2x^3 + 14x + 20x$. For which x is $f(x) > 0$?

8. The sketch below is of one of the following five functions, which one?

(A) $(x^2 - 5)/(x + 1)(x^2 + 1)$

(B) $(x^2 + 5)/(x + 1)(x^2 + 1)$

(C) $(x^2 - 5)/(x - 1)(x^2 + 1)$

(D) $(x^2 - 5)/(x + 1)(x^2 + 1)$

(E) $(x^2 + 5)/(x - 1)(x^2 + 1))$

Added November 1997. In the original problem we had provided a sketch. For practice graph each of the above.

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

9. Consider the function $f(x) = x^4 - x^2 - 1$.
   Sketch the complete graph of $f(x)$. Half the credit on this problem will be awarded for your argument that this graph is complete. Explain why your sketch identifies all the zero's of f.