Mathematics 121-A   Spring 2000

January 28, 2000

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                                                                        Name

Technology used: _____

Directions: Be sure to include in-line citations, including page numbers if appropriate, every time you use a text or notes or technology. Include a careful sketch of any graph obtained by technology in solving a problem. **Only write on one side of each page.**

The Problems

1. (15 points) In the following, write the inequalities in interval notation and the intervals in inequality notation.

   (a) $x \geq 23$

   (b) $\left(-\infty, \sqrt{5}\right)$

   (c) $-10 \leq x < -4$

2. (10 points each) Solve each equation or inequality. Do not use your calculator other than to check your answer.

   (a) $(2\sin(x) - 1)\left(2\sin(x) + \sqrt{2}\right) = 0$ on $[0, 2\pi)$

   (b) $|5x - 11| < 4$

3. (15 points each) Determine an equation, in general form, for any two (2) of the following lines.

   (a) The line through the point $(-2, 5)$ and parallel to $x + 5y + 1 = 0$.

   (b) A ray of light comes in along the line $x + 4y = 1$ from the second quadrant and reflects off the x-axis. The angle of incidence is equal to the angle of reflection. Write an equation for the line along which the departing light travels.

   (c) The line that is tangent to the circle $x^2 + (y-1)^2 = 169$ at the point $(12, 6)$.

4. (10 points) Evaluate the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = \frac{2}{x}$.

5. (10 points) Determine four functions f, g, h, k so that the following function is equal to the composition $(k \circ h \circ g \circ f)(x)$.
$$F(x) = \sqrt{\sin\left(\frac{1}{2-x}\right)}$$

6. (15 points) Three vertices of a parallelogram are $(1, 3), (4, 11)$ and $(3, -2)$. If $(1, 3)$ and $(3, -2)$ are endpoints of one side of the parallelogram, what is the fourth vertex?