

Math 115 Carter Final Exam Spring 2004

General Instructions: Write your name on only the outside of your blue book. Put your test paper inside your blue book as you leave. Do all of your work and write your solutions inside your blue book. Do not write on this test sheet. Solve each of the following problems.

1. Determine the equations and **sketch the graphs** of the following lines (*5 points each*):

- (a) The line that passes through the point $(0, -3)$ and that has slope -9 .
- (b) The line whose x -intercept is $(18, 0)$ and whose y -intercept is $(0, 12)$.
- (c) The line that passes through the point $(6, 5)$ and that is parallel to the line $y = 5x - 4$.

2. Solve the inequalities (*5 points each*):

- (a) $x \leq 1/x$
- (b) $|4x - 6| < 36$
- (c) $(x - 2)(x + 1)(x - 1) \leq 0$

3. Compute the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = \frac{1}{x-2}$. (*10 points*)

4. Sketch the graph of each of the following functions (*10 points each*):

- (a) $f(x) = 9x^2 - 54x - 10$
- (b) $f(x) = 30|x - 5| - 2$
- (c) $y = (x - 1)^2(x + 2)(x - 4)$
- (d) $y = 10^{(2x+4)}$
- (e) $y = \cos(x/3 - \pi/9)$
- (f) $y = \cot 10x$

5. (*10 point*) A bond will pay \$50,000 in 10 years. If the current interest rate is 5.75% per year continuously compounded interest, then what would you be willing to pay?

6. Solve the following triangles (in each of them (α, β, γ) are the respective angles opposite to the sides (A, B, C)) (10 points each):

(a) $a = 7, b = 24, c = 25$

(b) $a = 14, b = 12, \gamma = 42^\circ$.

7. Verify the identities: (5 points each)

(a) $\sec(x) = \sin(x)(\tan(x) + \cot(x))$

(b) $(\tan(x) - \sec(x))^2 = \frac{1 - \sin(x)}{1 + \sin(x)}$

8. (10 points) Solve for all values of $x \in [0, 2\pi]$:

$$2 \cos(2x) = \sqrt{3}.$$