

Math 115 Carter Final Exam Fall 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 $(0, 6)$ and that has slope 3.

(b) The line whose x -intercept is $(45, 0)$ and whose y -intercept is $(0, 72)$.

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

(a) $1/x < x$

(b) $20 < |40x - 6|$

3. (*5 points*) Compute the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = \frac{1}{x+5}$.

4. (*5 points*) Compute $(-1 + \sqrt{3}i)^6$.

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

(a) $f(x) = 9x^2 - 54x - 10$

(b) $f(x) = 3^{4x-5}$

(c) $f(x) = (x - 1)(x + 2)(x - 4)$

(d) $f(x) = 10 - e^{-x}$

(e) $y = 3 \cos(2x)$

6. (*10 point*) If the current interest rate is 8%, how long would you expect it would take for an investment of \$750,000 to grow to \$3,250,000?

7. 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) $a = 3, b = 4, c = 5$

(b) $a = 14, b = 12, \gamma = 48^\circ$.

8. Verify the identities: (10 points each)

(a) $\tan(x) + \sec x = \frac{\cos(x)}{1-\sin(x)}$

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

9. (10 points) Solve for all values of $x \in [0, 2\pi]$:

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