

Math 120ABC - Autumn 2002
Mid-Term Exam Number Two
November 21, 2002

Name: _____

Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
Total	60	

- Complete all questions.
- You may use a calculator during this examination. Other calculating devices are not allowed.
- If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 50 minutes to complete the exam.

1. Find the zeros and asymptotes, if any, of the following rational function:

$$f(x) = \frac{x^2 + 3x + 2}{2(x - 1)(x - 3)}.$$

2. Suppose

$$f(x) = 3 + \frac{4x}{b+x}.$$

Find b so that

$$f^{-1}(x) = \frac{15-5x}{x-7}.$$

3. Give the multi-part rule for the following function:

$$g(x) = |x| + |x - 3|.$$

4. An antarctic explorer is stranded on a cylindrical iceberg. The top of the iceberg is circular and flat. Ocean currents in the area are causing the iceberg to stay in the same place, but rotate slowly. Because of this rotation, the explorer has a linear speed of 0.2 meters/second. A penguin standing at a distance of 30 meters from the center of the top surface of the iceberg has a linear speed of 0.17 meters/sec.

(a) What is the angular velocity of the iceberg? Give the value in degrees per minute.

(b) What is the farthest the penguin could be from the explorer?

5. Moose's head is a sphere that expands and contracts in such a way that the radius is a sinusoidal function of time. You start observing Moose's head at time $t = 0$. After 42 minutes, the radius reaches a maximum of 6.2 cm for the second time. It takes 20.2 minutes for the radius to expand from its smallest size, 6.0 cm, to its largest.

Find the function $r(t)$ that describes the radius of Moose's head.

6. Find a value of x such that $4 < x < 6$ and

$$4 + 3 \sin(2x - 1) = 5.$$