

## Math 120 Exam II Review - Autumn 2005

Coverage: Chapters 9 - 16

In class and on this review sheet, I will review some key points of the course so far. However, you are expected to know ALL material that we have covered in these chapters.

As another study tool, please look at the practice exams online at

<http://www.math.washington.edu/m120/testindex.html>

### 1. Constructing Graphs

- Shift horizontally by  $h$ : Replace " $x$ " by " $x - h$ "
- Reflect over  $y$ -axis: Replace " $x$ " by " $-x$ "
- Horizontal Dilation: Replace " $x$ " by " $\frac{x}{c}$ "
  - If  $c > 1$ , then the graph is horizontally stretched.
  - If  $0 < c < 1$ , then the graph is horizontally compressed.
- Vertical information is identical to the info above except involving  $y$ .
- Recall how to identify the order of operations.

### 2. Arithmetic and Functions

- You should know how to work with a function that involves more than one multipart function. (*i.e.* be able to find the multipart rule) See the homework in Ch. 10.

### 3. Inverse Functions

- Given a function, you should be able to know the steps to find the inverse function.
- Also, understand how to working with non-invertible functions such as  $y = x^2$ .

### 4. Rational Functions

- Be able to find zeros, vertical asymptotes, and horizontal asymptotes of rational functions.
- Be able to find a linear-to-linear model from a story problem.

### 5. Angles, Arc Length and Areas of Wedges

- You should be comfortable working with degree and radian measures of angles.
- Understand and be able to use the formulas for arc length and area of a wedge.
- Recall:
  - $180 \text{ degrees} = \pi \text{ radians}$  (we use this to convert)
  - If  $\theta$  is in degrees, then Arc Length =  $s = \frac{\pi}{180}\theta r$  and Area of Wedge =  $\frac{\pi}{360}r^2\theta$ .
  - If  $\theta$  is in radians, then Arc Length =  $s = \theta r$  and Area of Wedge =  $\frac{1}{2}r^2\theta$ .
- Review the basic angles. You should be able to identify the radian measures  $\pi/6$ ,  $\pi/4$ ,  $\pi/3$ ,  $\pi/2$ ,  $\pi$ ,  $3\pi/2$ , and  $2\pi$  and what angles they represent on a circle.

## 6. Circular Motion

- Angular Speed =  $\omega = \frac{\text{change in angle}}{\text{change in time}}$ .
- Linear Speed =  $v = \frac{\text{change in distance}}{\text{change in time}}$
- You should be able to work with RPM's and you should know how to convert between angular speed and linear speed (Remember you need to know the radius.)
- 3 key formulas which only apply when  $\theta$  is in RADIANS and  $\omega$  is in RADIANS per unit time:
  - $s = r\theta$ , Arc Length = (radius)(angle)
  - $\theta = \omega t$ , Angle = (angular speed)(time)
  - $v = r\omega$ , Linear Speed = (radius)(angular speed)
- You should be comfortable with Belt and Wheel problems.

## 7. Circular Functions

- $\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}}$     $\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}}$     $\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$ .
- Know how to use these functions to answer questions about right triangles.
- Given a circle of radius  $r$  with the center as the origin, consider the point that is obtained by rotating by an angle of  $\theta$  in standard position. Then the  $(x, y)$  coordinates of this point are given by  $x = r\cos(\theta)$  and  $y = r\sin(\theta)$ .
- Be able to use the coordinate formula to answer questions about locations on a circle, even when the information given does not start in standard position.
- Understand how to use  $\tan(\theta)$  and  $-\frac{1}{\tan(\theta)}$  to find the slopes of lines with given angles.

## 8. Trigonometric Functions

- Be aware of the basic graphs of  $\sin(\theta)$ ,  $\cos(\theta)$ , and  $\tan(\theta)$ .
- Know the following key identities:
  - $\sin^2(\theta) + \cos^2(\theta) = 1$ , (please review how to use this notation).
  - $\sin(-\theta) = -\sin(\theta)$  and  $\cos(-\theta) = \cos(\theta)$ .
  - $\sin(\theta) = \sin(\theta + 2\pi n)$  and  $\cos(\theta) = \cos(\theta + 2\pi n)$  for  $n = 0, \pm 1, \pm 2, \dots$
  - $\cos(\theta) = \sin(\theta + \frac{\pi}{2})$  and  $\sin(\theta) = \cos(\theta - \frac{\pi}{2})$ .