

NAME _____

20 March 2009

MATH 124-002 — TEST III

PLEASE READ THESE INSTRUCTIONS:

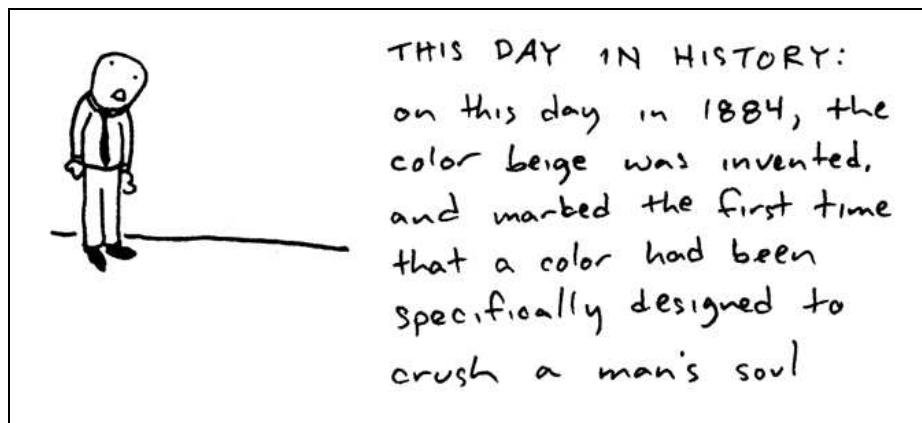
Problems have varying point values, which are specified next to each problem number. Any points you earn more than 100 will count as extra credit. Move quickly through the test, but try to be as accurate as you can.

You may use a graphing calculator, but **not** a calculator (such as the *TI-89*) capable of symbolic manipulation. You may not use your book or notes.

If you want credit for an answer, you **must** explain what you are doing – this means explaining **each step** in your work, particularly when you are using your calculator.

PLEASE TURN OFF YOUR CELL PHONE.

[Please do not write in the boxes below:]



(from <http://www.toothpastefordinner.com>)

1 :	18
2 :	18
3 :	10
4 :	24
5 :	8
6 :	8
7 :	10
8 :	10
9 :	12
Σ :	118

(3×6) 1 Find the exact value of the trigonometric function at the given real number:

(a) $\sin \frac{7\pi}{3}$

(b) $\csc \frac{7\pi}{3}$

(c) $\cot \frac{7\pi}{3}$

(d) $\csc \frac{7\pi}{6}$

(e) $\cos \frac{-3\pi}{2}$

(f) $\sin \frac{5\pi}{4}$

(6×3) **2** Find the amplitude, period, and phase shift of the function, and graph one complete period.

(a) $y = 2 + \cos\left(3x + \frac{\pi}{2}\right)$

(b) $y = \cos\left(\frac{\pi}{2} - x\right)$

(c) $y = \tan \frac{1}{2}\left(x + \frac{\pi}{4}\right)$

- (10) **3** In around 200BCE the Greek mathematician Eratosthenes estimated the circumference of the Earth as follows: he measured the distance between the cities Syene and Alexandria to be about 500 miles, and he noticed that at the moment that the sun's rays were falling straight down on Syene, they were coming down at an angle of 7.2° in Alexandria. He then calculated the Earth's circumference to be...?

- (8×3) **4** Find the exact values of the six trigonometric functions of the angle θ in the following triangles:
- (a)

(b)

(c)

(4+4) **5** Find the value of the side length x in the following triangles:

(a)

(b)

(8) **6** What is the exact area of the shaded region?

- (10) 7 To estimate the height of a mountain above a level plain, the angle of elevation to the top of the mountain is measured to be 32° . One thousand feet closer to the mountain along the plain, it is found that the angle of elevation is 35° . What is the height of this mountain?

- (10) 8 The bell tower of the cathedral in Pisa, Italy, leans 5.6° from the vertical. A tourist stands 105 meters from its base, with the tower leaning directly toward her. She measures the angle of elevation to the top of the tower to be 29.2° . How tall is the Leaning Tower of Pisa?

(2×6) **9** A triangle has sides of length 9, 13 and 20 units.

(a) What is the measure of the angle opposite the side of length 20?

(b) What is the area of the triangle?