

NAME _____

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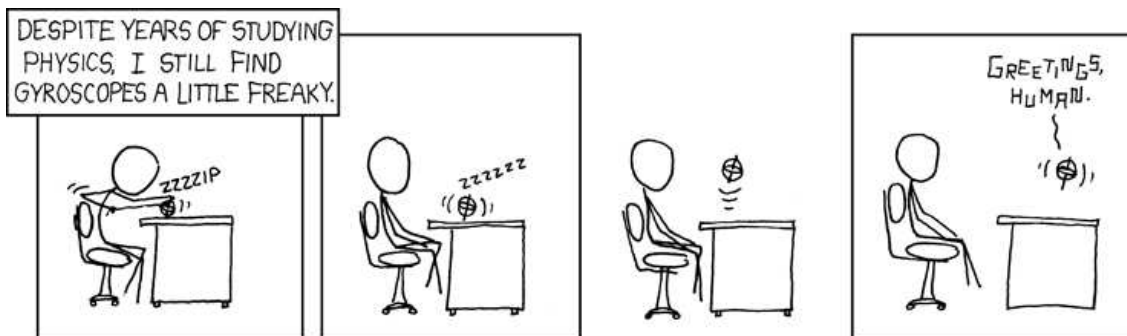
MATH 124-002 — TEST IV*PLEASE READ THESE INSTRUCTIONS:*

Problems have varying point values, which are specified next to each problem number. 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, but you may have a $4'' \times 6''$ card (both sides, if you like) of notes (or poetry, or whatever inspires you). Please turn in your note card with your test.

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. If it is possible to give an exact answer, please do so – for example, if the question is “give a number x such that $x^2 = 2$ ”, then the answer “ $\sqrt{2}$ ” will receive full credit, while “1.414213562” will receive much less than full credit; in fact, if the question is “what is the exact value of a number x such that $x^2 = 2$ ”, then “1.414213562” will receive essentially zero credit.

PLEASE TURN OFF YOUR CELL PHONE.



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

		EC :
1 :	/32	
2 :	/16	
3 :	/16	
4 :	/25	
5 :	/24	
6 :	/24	
Σ :	/137	

(4×8) 1 Verify the following trigonometric identities:

(a) $\frac{\tan \theta}{\csc \theta} = \sec \theta - \cos \theta$

(b) $\cot(-\alpha) \cos(-\alpha) + \sin(-\alpha) = -\csc \alpha$

(c) $\tan y = \frac{\sin(x+y) - \sin(x-y)}{\cos(x+y) + \cos(x-y)}$

(d) $\frac{2 \tan x}{1 + \tan^2 x} = \sin 2x$

(2×8) **2** Find **all** solutions to the following equations (exact values, please!):

(a) $3 \tan^3 x = \tan x$

(b) $2 \cos^2 x - 1 = 0$

(2×8) **3** Find (exactly!) those solutions to the following equations which lie in the interval $[0, 2\pi)$:

(a) $\sin x = \cos 2x$

(b) $\sin x - 2 \sin^2 x = 0$

(5×5) **4** Find the exact values (when they exist) of:

(a) $\sin(\cos^{-1} \frac{3}{8})$

(b) $\cos(\sin^{-1} \frac{5}{13} - \cos^{-1} \frac{4}{5})$

(c) $\tan(\sin^{-1} \frac{2}{5})$

(d) $\cos^{-1}(\cos \frac{-4\pi}{3})$

(e) $\sin(2 \sin^{-1} x)$ [Yes, the answer to this one will be a (simply gorgeous!) formula in terms of x .]

(3×8) **5**

In the following equations, **identify** which conic section is described.

- If it is a parabola, find the vertex, focus, directrix and focal diameter.
- If it is an ellipse, find its center, vertices, foci, major and minor axes and eccentricity.
- If it is a hyperbola, find its center, vertices, foci and asymptotes.

In all cases, **sketch** the curve.

(a) $x^2 + 8y = 0$

(b) $\frac{(x-3)^2}{9} + \frac{y^2}{16} = 1$

(c) $x^2 - y^2 + 144 = 0$

(3×8) **6** In each case, find an equation for a conic with the desired properties.

(a) An ellipse whose minor axis has endpoints $(0, \pm 3)$ and whose foci are 8 units apart.

(b) A parabola with directrix $y = -12$ and vertex $(-6, 0)$.

(c) A hyperbola with vertices $(0, \pm 6)$ which passes through the point $(-5, 9)$.