## EXAM 1

Math 212, 2015-2016 Fall, Clark Bray.

You have 50 minutes.

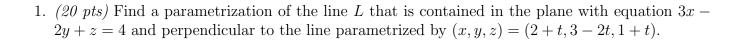
No notes, no books, no calculators.

## YOU MUST SHOW ALL WORK AND EXPLAIN ALL REASONING TO RECEIVE CREDIT. CLARITY WILL BE CONSIDERED IN GRADING.

All answers must be simplified. All of the policies and guidelines on the class webpages are in effect on this exam.

Good luck!

		Name	
Disc.:	Number	TA	Day/Time
	1		"I have adhered to the Duke Community Standard in completing this examination."
	2		Signature:
	3		
	4		
	5		
	6		
			Total Score (/100 points)



2. (10 pts) The curve C is parametrized by

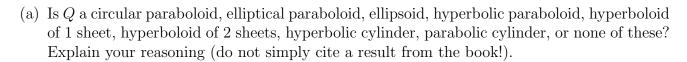
$$\vec{x}(t) = \begin{pmatrix} t - 1 \\ t^2 - t \\ t^3 - t^2 \end{pmatrix}$$

At the moment this curve passes through the origin, compute the velocity, acceleration, and curvature.

3. (10 pts) Compute the limit below, or show that it does not exist.

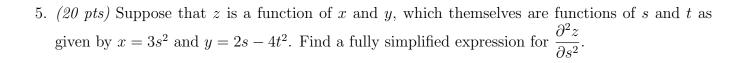
$$\lim_{(x,y)\to(0,0)} \frac{x^4 - 3xy^5}{x^4 + y^4}$$

4.	(20 pts) The surface $Q$ has equation $-x$	$x^2 - y^2 + z^2 = 1$	t; the surface	S is the part	of $Q$ above the
	xy-plane.				



(b) Is Q a level set of a function f? If so, indicate the domain, target, and formula for f.

(c) Is S the graph of a function g? If so, indicate the domain, target, and formula for g.



6. (20 pts) The concentration of air pollution (in units of ppm) in a region is given by

$$C(x,y) = \arctan(6 - x^2 - y^2)$$

Use the directional derivative to compute  $\frac{dC}{ds}$  for a particle that is at the point (1,2) and moving with velocity (5,12).