List of specifically labeled Problems/Definitions in the chapter files and a short description:

firstreview --- the first review problem, graphing functions.

differentialtangentline -- review problem on differentials and their connection to the tangent.

diff-sphere -- differential problem related to sphere size.

**Chapter 2:**

def:vecadd

prob:donkey – Donkey-Vector problem from chapter 2

prob:horseline – chapter 2 problem about a horse and a line with vectors.

prob:dot angle practice – chapter 2 problem that compares dot-produce to law of cosines/angle.

prob:dot angle practice2 – chapter 2 problem that compares dot-produce to law of cosines/angle. (SECOND PART)

prob:dot product facts – A bunch of dot-product properties.

prob:dot prep – proof of magnitude squared subtraction in vectors

prob:dot angle formula – derivation of dot-product to magnitude/cosine definition.

review:matrices – where matrices and determinants are introduced/reviewed.

prob:crossproduct normalvector

prob:plane equation normal point

prob:plane equation three points

prob:force intro – problem on projections and force

first work problem – the first time we encounter using the projection/dot product to find work.

**Chapter 3**

prob:polar coordinate equations -- statement of the various polar coordinate equations.

polar coordinate transformation graph -- transforming polar coordinates.

prob:transform1 – first coordinate transform of non-polar. R2->R2

Missing: graphing spherical coordinates

**Chapter 4: Parametric Equations**

prob:line equation practice – generate parametric equation for line through 2 points (3-D) *Is there a better, earlier one??*

sec:derivatives and tangent lines – A the section introducing vector derivatives and their relationship to a tangent line/equation of a line.

def:velocity acceleration – defines the first and second derivative of a position function as the velocity/acceleration.

**Chapter 5: Functions**

prob:pebbles – introductory problem that has a pebble dropping off a building in time

prob:parametric curve in plane -- or, the horse on a track problem.

prob:jet intro for space curves -- first problem about space curves and jets also labeled: “space curve example”

prob:function table -- first introduction of the table for understanding input/output of functions.

prob:parametric surface example -- multiple jets!

prob:3dsurface plot -- introduction to how to create a 3-d surface plot

prob:intro to contour plots -- first problem that describes how to do contour plots.

sec:functionlist – the long list of various function types with input/output dimensions.

graphing spherical coordinates – problem that examines spherical transformations again.

**Chapter 6: Derivatives**

prob:differential volume of a cylinder --- as problem label says.

prob:volumebox – differential volume of a box.

prob:second partials agree

prob:tangent line1 --- More tangent line problems!!

prob:tangent plane downbowl -- Tangent plane to 9-x^2-y^2

prob:chain rule review -- Calc I/II review problem for chain rule

prob:horse track chain -- uses the chain rule on a horse on a downbowl with heating.

def:chain rule

**Chapter 7: Motion**

arc length2 – arc length equation again in this chapter.

def:smooth curve --- definition of what it means to be a smooth curve.

fundamental theorem of calculus as it applies to arc length parameter – as name implies.

prob:basic helix – tangent of helical curve: (cos t, sin t , t)

def:unit tangent vector – as name implies!

def:curvature

**Chapter 8: Line Integrals**

prob:centroid of a curve – uses integrals to compute the centroid of a curve

prob:semicircle centroid – uses integrals to compute the centroid of a semi-circle

center of mass with two points

center of mass of a curve

**Chapter 9: Optimization**

prob:gradient to tangent practice

**Chapter 10: Double Integrals**

prob:double-int half parabolic – first actual double integral problem. Referenced again in Unit 11

**Chapter 11: Surface Integrals**

sphere surface area element – derivation of the components to compute surface area on a sphere

2d\_div – practice computations for finding the divergence on 2-dimensional fields

3d\_div – practice finding divergence on 3-d fields.