MA 2733
Worksheet 7 / Review – November 15, 2016

Name _____

1. Find a power series representation around 0 for $f(x) = \dfrac{\sin x^2}{x^2}$.
   Hint: first find a power series representation for $\sin x^2$. What is the initial term of this series?

2. (a) If $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ are orthogonal, then $\text{proj}_{\vec{\mathbf{a}}}\vec{\mathbf{b}}$ is which of the following?
   a) $\vec{\mathbf{a}}$ b) $\vec{\mathbf{b}}$ c) $\vec{\mathbf{a}} + \vec{\mathbf{b}}$ d) $\vec{\mathbf{a}} - \vec{\mathbf{b}}$ e) $\vec{\mathbf{0}}$

   (b) If $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ are parallel, then $\text{proj}_{\vec{\mathbf{a}}}\vec{\mathbf{b}}$ is which of the following?
   a) $\vec{\mathbf{a}}$ b) $\vec{\mathbf{b}}$ c) $\vec{\mathbf{a}} + \vec{\mathbf{b}}$ d) $\vec{\mathbf{a}} - \vec{\mathbf{b}}$ e) $\vec{\mathbf{0}}$

3. Find a vector having length 1 that is orthogonal to $\langle 1, 2, 3 \rangle$.

Review of main topics for Exam 3

Chapter 11

power series operations —
- "plug in" $-x, x^2,$ etc
- addition
- multiply by $x, x^2,$ etc
- differentiate
- integrate

Taylor Coefficient Theorem and Taylor Series
Finding Taylor Series of nice functions like e^x, $\cos x$.
Using power series ops to represent functions involving e^x, $\cos x$, $\sin x$, etc as power series.

Chapter 12

vectors —
- vectors addition and scaling
- dot products, angles
- cross products + their properties
- orthogonality
- projections

geometry —
- lines in 3d
- planes in 3d
- graphing surfaces - traces

Chapter 13

vector functions —
- idea and examples
- limits
- derivatives
- tangent and unit tangent vectors
- arc length

Proofs, explanations, and derivations that are fair game

Taylor Coefficient Theorem

How to find power series for e^x, $\cos x$

Dot product cosine formula

Derivation of the formula for $\text{proj}_{\vec{\mathbf{a}}}\vec{\mathbf{b}}$

Why $\vec{\mathbf{a}} \times \vec{\mathbf{b}}$ is orthogonal to $\vec{\mathbf{a}}$

Relation between vector function derivative and component function derivatives