Math 126 - Winter 2007
Exam 1
January 25, 2007

Name: ______________________________

Section: ______________________________

Student ID Number: ______________________________

TA's Name: ______________________________

1	12	
2	10	
3	12	
4	12	
5	14	
Total	60	

- You are allowed to use a scientific calculator (no graphing calculators) and one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.
- Check that your exam contains all the problems listed above.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit.
- If you need more room, use the backs of the pages and indicate to the grader that you have done so.
- Raise your hand if you have a question.
- Any student found engaging in academic misconduct will receive a score of 0 on this exam.
- You have 50 minutes to complete the exam.

GOOD LUCK!

1. (12 points) Let $\vec{a} =< 3, -1, 2 >$ and $\vec{b} = 5\vec{i} - 7\vec{j} + 2\vec{k}$.

   (a) (4 points) The equation for a sphere is given by $x^2 + (y-3)^2 + z^2 = 12 + 12x - 4z$. Find the distance from the origin to the center of the sphere.

   (b) (4 points) Find $\vec{a} \cdot \vec{b}$.

   (c) (4 points) Find the angle, θ, between the vectors $\vec{a}$ and $\vec{b}$. Give your answer in radians such that $0 \leq \theta \leq \pi$. (Round your answer to 3 digits after the decimal point.)

2. (10 points)

(a) (5 points) Find all values of x so that $\vec{a} =< 1, x, -4 >$ and $\vec{b} =< x, 3, 5 >$ are orthogonal.

(b) (5 points) Find a **unit** vector that is orthogonal to both $\vec{a} =< 1, 4, 5 >$ and $\vec{b} =< -1, 3, 0 >$.

3. (12 points) Give the Taylor series for $g(x) = \int_0^x \cos(t^3)\, dt$ based at $b = 0$.

   Write your answer using sigma notation, write out the first 3 nonzero terms, and give the open interval of convergence.

4. (12 points) Give the Taylor series for $f(x) = \dfrac{4x}{5x+1} - xe^{3x}$ based at $b = 0$.

Write your answer using sigma notation, write out the first 3 nonzero terms, and give the open interval of convergence.

5. (14 points) Let $g(x) = e^{x/2}$ and let $I = [0, 2]$.

(a) (5 points) Find the second Taylor polynomial, $T_2(x)$, for $g(x)$ based at $b = 1$.

(b) (5 points) Use Taylor's inequality to find a bound on the error for $T_2(x)$ in the interval $I = [0, 2]$.

(c) (4 points) Find the first value of n for which the error bound given by Taylor's inequality for $T_n(x)$ in the interval $I = [0, 2]$ is less than 0.001.