

Math 126 DA- Spring 2007
Midterm 1
April 19, 2007

Name: _____

Student ID Number: _____

1	10	
2	10	
3	10	
4	15	
5	15	
Total	60	

- You are allowed to use a scientific calculator only (no graphing calculators) and one, **hand-written**, double-sided page of notes.
- 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.
- Leave answers in exact form.
- Remember to check your work.

1. (10 points) Find the Taylor series for $f(x) = \frac{1}{(1-x)(1-3x)}$ based at $b = 0$ and find the interval of convergence.

2. (10 points) Consider the two vectors $\mathbf{a} = \langle 1, 2, 3 \rangle$ and $\mathbf{b} = \langle 2, 3, 4 \rangle$. Calculate the following:

(a) (4pts) The cosine of the angle between \mathbf{a} and \mathbf{b}

(b) (4pts) $\mathbf{a} \times \mathbf{b}$

(c) (2pts) The area of the parallelogram with corner points $P(0, 0, 0)$, $Q(1, 2, 3)$, $R(2, 3, 4)$, $S(3, 5, 7)$

3. (10 points) Consider the function $f(x) = \sin(x)$

(a) (5pts) Find the second Taylor polynomial, $T_2(x)$, for f based at $b = \pi/2$.

(b) (5pts) Find an interval J containing $b = \pi/2$ such that the error, $|f(x) - T_2(x)|$ is less than 0.01 for all x in J

4. (15 points) Consider the function

$$f(x) = \int_0^x \frac{e^t - 1}{t} dt$$

(a) (10pts) Find the Taylor series for $f(x)$ based at $b = 0$

(b) (5pts) Find $f^{(6)}(0)$

5. (15 points) Let $\mathbf{v} = \langle 1, 3, -1 \rangle$ and $\mathbf{r}_0 = \langle 1, 1, 1 \rangle$ and consider the line given by, $\mathbf{r} = \mathbf{r}_0 + t\mathbf{v}$, in vector form. Also consider the plane given by $x + 2y + 2z + 2 = 0$

(a) (5pts) Show that the line and the plane are not parallel

(b) (10pts) Find a point on the line at distance 3 from the plane