

Math 126, Sections C and D, Fall 2007, Midterm I

October 17, 2007

Name _____

TA/Section _____

Instructions.

- There are 4 questions. The exam is out of 40 points.
- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. You can have formulas or theorems you have trouble remembering on your sheet but not any specific examples or solved problems. **Hand in your notes with your exam paper.**
- You may use a calculator which does not graph and which is not programmable. Even if you have a calculator, give me exact answers. ($\frac{2\ln 3}{\pi}$ is exact, 0.7 is an approximation for the same number.)
- **Show your work.** If I cannot read or follow your work, I cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work. If you continue at the back of a page, make a note for me. Please **BOX** your final answer.

Question	points
1	
2	
3	
4	
Total	

1. For the questions below use the points $P(2, 1, 5)$, $Q(-1, 3, 4)$ and $R(3, 0, 6)$.

(a) Find a vector orthogonal (perpendicular) to the plane through the points P , Q and R .

(b) Find the area of the triangle PQR .

(c) Determine if the point $T(0, 3, 3)$ is on the same plane as P , Q and R .

2. Estimate $\sqrt{10}$ to 3 decimal places (i.e. with an error of less than 0.0005) using an appropriate Taylor polynomial.

Start by

$$f(x) =$$

$$b =$$

$$n =$$

$$x =$$

3. Write down the Taylor series for the following functions and give the interval for which they converge. Write your answers in sigma notation and write the first 3 nonzero terms explicitly.

(a) $f(x) = \frac{2}{4x^2+9}$ based at $b = 0$.

(b) xe^x based at $b = 1$.

4. Determine whether the statement is TRUE or FALSE. If it is TRUE, explain why. If it is FALSE, explain why or give an example that disproves the statement.

(a) For $f(x) = x^5 + 3x^4 + 4x^2 + 2$ the third Taylor polynomial based at $b = 0$ is $T_3(x) = 2 + 4x^2$.

(b) The length of the sum of two vectors is the sum of their lengths.

(c) The Taylor series for $\sin(2x^3)$ based at $b = 0$ is convergent for all values of x .

(d) For any two vectors \vec{u} and \vec{v} , $(\vec{u} \times \vec{v}) \cdot \vec{u} = 0$.

(e) The cross product of two unit vectors is a unit vector.

(f) If $f(x) = \cos(2x^3)$ then $f^{(6)}(0) = -1440$.