

MIDTERM 1

MATH 126 A, B Last name, first name: _____

Section: _____

Student number: _____

Signature: _____

Please do not start working until instructed to do so.

You have 50 minutes.

Please show your work.

Scientific, but not graphing calculators are OK.

You may use one 8.5 by 11 sheet of handwritten notes.

Problem 1. _____

Problem 2. _____

Problem 3. _____

Problem 4. _____

Problem 5. _____

Total. _____

Problem 1. (11 points) Consider the function $f(x) = \cos(2x)$.

a. (5 points) Write the second order Taylor polynomial $T_2(x)$ for $f(x)$ centered at $b = \frac{\pi}{6}$.

b. (6 points) Find a bound on the error $|f(x) - T_2(x)|$ on the interval $[0, \frac{\pi}{3}]$.

Problem 2. (12 points) Write down the Taylor series for each of the following functions and give the interval on which they converge. (You need to use the sigma notation for full credit.)

a. (6 points) $f(x) = e^{2x+1}$ centered at $b = 2$.

b. (6 points) $f(x) = \frac{3}{4+5x}$ centered at $b = 0$.

Problem 3. (10 points) Find the equation of the plane passing through the point $(1, 3, 4)$ and containing the line $x = 3 + t$, $y = 3 - 2t$, $z = -1 + t$. Give your answer in the form $ax + by + cz + d = 0$.

Problem 4. (9 points) Are the lines

$$x = 1 + t, y = 4 - t, z = 2t \quad \text{and} \quad x = 7 - 2t, y = 1 - t, z = 7 + t$$

skew or do they intersect? If they are skew, clearly say why. If they do intersect, find the point of intersection.

Problem 5. (8 points) Is the triangle with vertices $(2, 0, 0)$, $(4, 3, 5)$, $(0, 1, 3)$ a right triangle? Clearly justify your answer.