

MATH 2550

Midterm Exam

September 22, 2006

NAME (please print legibly): _____

Please complete all 5 questions in the space provided. You may use the backs of the pages for extra space, or ask me for more paper if needed. Work carefully, and try to complete the problems you find easier before going back to the harder ones.

Good luck!

QUESTION	VALUE	SCORE
1	10	
2	10	
3	10	
4	10	
5	10	
TOTAL	50	

1. (10 points) Find an equation for the plane through the points $(2, 4, 1)$, $(0, 0, 1)$ and $(0, 0, 7)$ in the form $ax + by + cz = d$.

ANSWER: _____

2. (10 points)

Find the **unit** tangent vector to the curve $\vec{r}(t) = (\sin t, 3t^2, \ln t)$ at the point $t = \pi$. If your answer is not a unit vector, you will lose points on this question.

ANSWER: _____

3. (10 points) Find the arclength of the curve $\vec{r}(t) = (\cos^3 t, \sin^3 t)$ on the interval $0 \leq t \leq \pi/2$.

ANSWER: _____

4. (10 points) A racecar driver drives on a mountain road. Her position function is $\vec{r}(t) = (\cos t, 2 \sin t)$. The height of the mountain is given by the function $h(x, y) = x^2 - 2xy + 3y^2$. Find the rate of change of her elevation at a function of t . Hint: We are computing $\frac{d}{dt}h(\vec{r}(t))$.

ANSWER: _____

5. (10 points) Sketch the level curves of the function shown below. Use the x and y coordinate values shown on the sides of the plot to help you figure out the shape of the curves.

