

# MTH 263 Practice Test #3

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**Instructions.** Answers follow this section. Solutions follow the Answer Section.

1. Sketch the space curve generated by the vector-valued function  $r(t) = 3 \cos(t) \vec{i} + 4 \sin(t) \vec{j} + \frac{1}{2}t \vec{k}$
2. Compute the velocity and acceleration vectors for the vector in problem 1, evaluate and graph these vectors at  $t = \frac{\pi}{2}$
3. Evaluate:  $\int_{-2}^3 (t \vec{i} + t^3 \vec{j} + 4t \vec{k}) dt =$
4.  $a(t) = 4 \vec{i} + 3 \vec{k}$ . Compute the velocity and position vectors, given the following information:
  - (a)  $v(0) = 4 \vec{j} + \vec{k}$
  - (b)  $r(0) = 2 \vec{i}$
5. Compute the speed of the vector in problem 4 at the point  $t = 4$  sec.
6. Given the vector  $r(t) = 2 \sin(t) \vec{i} + 2 \cos(t) \vec{j}$ , compute the vectors  $\mathbf{T}(t)$ ,  $\mathbf{N}(t)$ , and evaluate them at  $t = \frac{\pi}{4}$ .
7. For the vector in problem 6, evaluate  $\mathbf{a}_T$ , and  $\mathbf{a}_N$  at  $t = \frac{\pi}{4}$ .
8. Compute  $\frac{\partial}{\partial x} [\sin(x^2y) + x^3 - 5y^4]$
9. Given  $f(x, y) = \sin(x - 2y)$ , show that  $f_{xy} = f_{yx}$
10. Find the relative maxes and mins of the function  $f(x, y) = x^3 - y^3 - 3xy + 4$