For #1 – 3, Interpret $r(t)$ as the position of a moving object at time $t$.

$r(t) = \sin(2t)i + \cos(2t)j - \sqrt{5}t k$

1. Find the unit tangent vector
   
   a. $T(t) = \cos(2t)i - \sin(2t)j$
   
   b. $T(t) = \cos(2t)i - \sin(2t)j - \sqrt{5}k$
   
   c. $T(t) = \frac{2}{3}\cos(2t)i - \frac{2}{3}\sin(2t)j - \frac{\sqrt{5}}{3}k$
   
   d. $T(t) = \frac{2}{\sqrt{13}}\cos(2t)i - \frac{2}{\sqrt{13}}\sin(2t)j - \frac{\sqrt{5}}{\sqrt{13}}k$
   
   e. None of these

2. Find the principal normal vector
   
   a. $N(t) = -\sin(2t)i - \cos(2t)j$
   
   b. $N(t) = \sin(2t)i + \cos(2t)j$
   
   c. $N(t) = -\frac{4}{3}\sin(2t)i - \frac{4}{3}\cos(2t)j$
   
   d. $N(t) = -\frac{4}{3}\cos(2t)i - \frac{4}{3}\sin(2t)j$
   
   e. None of these

3. Find the curvature
   
   a. $\kappa = 4$
   
   b. $\kappa = 4/3$
   
   c. $\kappa = 3$
   
   d. $\kappa = 4/9$
   
   e. None of these
4. Suppose $r(t)$ is a parameterization for a curve $C$ such that $r'(t) \neq 0$ and $T'(t) \neq 0$ for all $t$. The principal normal vector $N(t)$ will always be ____ to $T(t)$.
   a. Adjacent
   b. Co-linear
   c. Parallel
   d. Perpendicular
   e. None of the above

5. Find the domain of the given function:
   \[ f(x, y) = \frac{3}{\sqrt{y - 5x^2}} \]
   a. \{(x, y) | y \leq 5x^2\}
   b. \{(x, y) | y > 5x^2\}
   c. \{(x, y) | y \neq 5x^2\}
   d. \{(x, y) | y < 5x^2\}
   e. \{(x, y) | y \geq 5x^2\}
   f. None of these

6. Find the range of the given function:
   \[ f(x, y) = \frac{3}{\sqrt{y - 5x^2}} \]
   a. \[0, \infty\]
   b. \((0, \infty)\)
   c. \[1, \infty\]
   d. \((1, \infty)\)
   e. \((-\infty, \infty)\)
   f. None of these

7. What is the number of quadric surfaces with which you should be familiar?
   a. 5
   b. 7
   c. 9
   d. 11
   e. 0
8. The correct answer for problem 3 from LecPop05_1 was which of the following?
   a. A
   b. B
   c. C
   d. D
   e. E

9. The correct answer for problem 2 from LecPop05_2 was which of the following?
   a. A
   b. B
   c. C
   d. D
   e. E

10. Choose A