



9. (1 point)
Find $\mathbf{r}(t)$ and $\mathbf{v}(t)$ given acceleration
 $\mathbf{a}(t) = \langle t, 5 \rangle$,
initial velocity
 $\mathbf{v}(0) = \langle 6, -1 \rangle$,
and initial position
 $\mathbf{r}(0) = \langle 0, 0 \rangle$.

$\mathbf{v}(t) =$ _____
 $\mathbf{r}(t) =$ _____

Usage: To enter a vector, for example $\langle x, y, z \rangle$, type “ $\langle x, y, z \rangle$ ”

- Correct Answers:
- $\langle 1/2*t^2+6, 5*t+-1 \rangle$
 - $\langle 1/6*t^3+6*t, 5/2*t^2+-1*t \rangle$

10. (1 point) Consider the helix $\mathbf{r}(t) = \langle \cos(3t), \sin(3t), -4t \rangle$. Compute, at $t = \frac{\pi}{6}$:

- A. The unit tangent vector $\mathbf{T} = \langle _, _, _ \rangle$
B. The unit normal vector $\mathbf{N} = \langle _, _, _ \rangle$
C. The unit binormal vector $\mathbf{B} = \langle _, _, _ \rangle$
D. The curvature $\kappa =$ _____

- Correct Answers:
- -0.6
 - 3.67394039744206E-17
 - -0.8
 - -6.12323399573677E-17
 - -1
 - 0
 - -0.8
 - 4.89858719658941E-17
 - 0.6
 - 0.36

11. (1 point) Find the curvature of $y = \sin(1x)$ at $x = \frac{\pi}{4}$.

- Correct Answers:
- 0.38490017945975

12. (1 point) Find the curvature $\kappa(t)$ of the curve $\mathbf{r}(t) = (-4 \sin t)\mathbf{i} + (-4 \sin t)\mathbf{j} + (-5 \cos t)\mathbf{k}$

- Correct Answers:
- $(2*(-4*-5)**2)**.5/((-5*\sin(t))**2 + 2*(-4*\cos(t))**2)$

13. (1 point) The parabola given by the equation $x = y^2 + 8y + 6$. The curvature of this parabola attains its maximum value at (h, k) for:

$h =$ _____
and
 $k =$ _____

- Correct Answers:
- -10
 - -4

Also, compute the velocity and acceleration vectors at $t = 1$, and use this information to determine the direction of motion for the curve.

The correct graph is A.

$\mathbf{v}(1) =$ _____

$\mathbf{a}(1) =$ _____

The direction of motion is A.

Usage: To enter a vector, for example $\langle x, y, z \rangle$, type “ $\langle x, y, z \rangle$ ”

- Correct Answers:
- D
 - $\langle 3, -2 \rangle$
 - $\langle 6, -2 \rangle$
 - LR

8. (1 point)

Calculate the velocity and acceleration vectors, and speed for

$$\mathbf{r}(t) = \langle \sin(6t), \cos(t), \cos(6t) \rangle$$

when $t = \frac{\pi}{6}$.

Velocity: _____

Acceleration: _____

Speed: _____

Usage: To enter a vector, for example $\langle x, y, z \rangle$, type “ $\langle x, y, z \rangle$ ”

- Correct Answers:
- $\langle -6, -0.5, 0 \rangle$
 - $\langle 0, -0.866025, 36 \rangle$
 - 6.0208