

## Quiz 4

MATH 261, CALCULUS III, FALL 2017

CLASS TIME:

NAME:

**Instructions:** Solve as many of these problems as you can. Circle the correct answer, and show your work!

**Problem 1** A particle moves with acceleration  $\vec{a}(t) = e^t \vec{k}$  and initial velocity and position given by  $\vec{v}(0) = 0$  and  $\vec{r}(0) = \vec{j} + \vec{k}$  respectively. Where is the particle at time  $t = 2$ ?

- (a)  $(0, 1, e^2 - 2)$
- (b)  $(0, 1, e^2)$
- (c)  $(0, 1, e - 1)$
- (d)  $(1, 1, e^2 - 2)$
- (e)  $(1, 1, e^2)$ .

**Problem 2** A particle moves along according to  $\vec{r}(t) = \langle 5t, 1 - 3t, 5 + 4t \rangle$  for  $t \geq 0$ . What is the  $x$  coordinate of the particle after it has traveled a distance of 2 units along the curve?

- (a) 10
- (b)  $\sqrt{2}$
- (c)  $5\sqrt{2}$
- (d)  $\frac{1}{10}$
- (e)  $\frac{5\sqrt{2}}{2}$ .

**Problem 3** The unit tangent vector to the curve  $\vec{r}(t) = t\vec{i} + 3t^2\vec{j} + 4\sin t\vec{k}$  at  $t = \pi/3$  is

- (a)  $\vec{i} + 2\pi\vec{j} + 2\vec{k}$
- (b)  $(\vec{i} + 2\pi\vec{j} + 2\vec{k})/\sqrt{5}$
- (c)  $\vec{i} + \pi\vec{j} + 2\sqrt{3}\vec{k}$
- (d)  $(\vec{i} + \pi\vec{j} + 2\sqrt{3}\vec{k})/\sqrt{13 + \pi^2}$
- (e)  $(\pi\vec{j} + \vec{k})/\sqrt{1 + \pi^2}$ .

**Problem 4** The values of  $a$  and  $b$  such that the line

$$x = 1 + at, \quad y = bt, \quad z = 5t$$

is the line of intersection of the planes

$$x + 2y - z = 1, \quad 2x - y + z = 2$$

are

- (a)  $a = 1, b = 0$
- (b)  $a = -1, b = 3$
- (c)  $a = -1, b = 2$
- (d)  $a = 0, b = 1$
- (e)  $a = 1, b = 1$ .