TAM 212. Midterm 1. Mar. 5, 20145.

Discussion 'Quiz'

- There are 20 questions, each worth 5 points.
- You must not communicate with other students during this test.
- No electronic devices allowed.
- This is a 2 hour exam.
- Do not turn this page until instructed to do so.
- There are several different versions of this exam.

1. Fill in your information:

Full Name: _____

UIN (Student Number): _____

NetID: _____

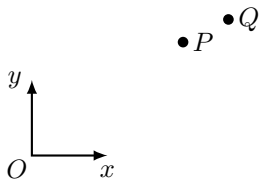
2. Circle your discussion section:

	Monday	**Tuesday**	**Wednesday**	**Thursday**
8–9				
9–10		ADC (260 MEB)		ADK (260 MEB)
10–11		ADD (335 MEB)		
11–12		ADE (335 MEB)		ADL (153 MEB)
12–1	ADA (243 MEB)	ADF (335 MEB)	ADJ (335 MEB)	ADN (260 MEB)
1–2				
2–3				
3–4				
4–5			ADO (260 MEB)	
5–6	ADB (260 MEB)	ADH (260 MEB)	ADM (243 MEB)	

3. Fill in the following answers on the Scantron form:

91. A
92. A
93. A
94. A
95. D
96. C

1/1. (1 point) Points P and Q are moving in circular paths around the origin O with angular velocities ω_P and ω_Q.



The two particles are moving with the same speed. Which statement is true?

A. $|\omega_P| \leq \frac{1}{2}|\omega_Q|$

B. $\frac{1}{2}|\omega_Q| < |\omega_P| \leq |\omega_Q|$

C. $|\omega_Q| < |\omega_P| \leq 2|\omega_Q|$

D. $2|\omega_Q| < |\omega_P|$

2/1. (1 point) A particle moves so that its position vector in the Cartesian basis is given by

$$\vec{r} = \cos t\,\hat{\imath} + \sin t\,\hat{\jmath} + t\,\hat{k} \text{ m}.$$

Using cylindrical coordinates, what is the angular component of velocity v_θ at $t = \pi/4$ s?

A. $v_\theta < -1$ m/s

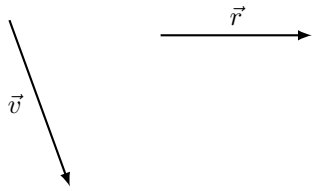
B. -1 m/s $\leq v_\theta < 0$ m/s

C. $v_\theta = 0$ m/s

D. 0 m/s $\leq v_\theta < 1$ m/s

E. 1 m/s $\leq v_\theta$

3/1. (1 point) The position vector $\vec{r}$ and velocity $\vec{v}$ for a single particle P are shown below at a particular instant.



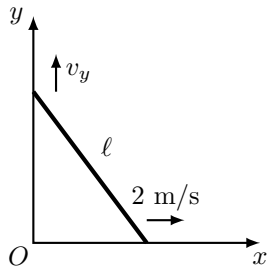
Which statement about $\dot{r}$ is true at this instant?

A. $\dot{r} > 0$

B. $\dot{r} = 0$

C. $\dot{r} < 0$

4/1. (1 point) A ladder leaning against the wall has a fixed length of $\ell = 5$ m. The bottom of the ladder is 3 m from the wall and is moving along the ground away from the wall at a speed of 2 m/s. What is the vertical component of the velocity v_y of the top of the ladder, assuming it remains in contact with the wall?



A. $v_y < -1$ m/s

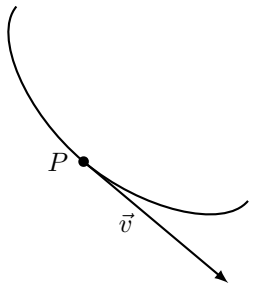
B. -1 m/s $\leq v_y < 0$ m/s

C. $v_y = 0$ m/s

D. 0 m/s $< v_y < 1$ m/s

E. 1 m/s $< v_y$

5/1. (1 point) A point P is moving around a curve and at a given instant has position and velocity $\vec{v}$ as shown.



Which direction is the closest to the direction of the normal basis vector $\hat{e}_n$ at the instant shown?

A. ↙

B. ↘

C. ↖

D. ↗