Midterm 1

1. Academic Integrity - Code of Conduct

UCLA is a community of scholars committed to the values of integrity. In this community, all members including faculty, staff, and students alike are responsible for maintaining the highest standards of academic honesty and quality of academic work. As a student and member of the UCLA community, you are expected to demonstrate integrity in all of your academic endeavors. When accusations of academic dishonesty occur, the Office of the Dean of Students investigates and adjudicates suspected violations of this student code. Unacceptable behavior include cheating, fabrication or falsification, plagiarism, multiple submissions without instructor permission, using unauthorized study aids, facilitating academic misconduct, coercion regarding grading or evaluation of coursework, or collaboration not authorized by the instructor. Please review our campus' policy on academic integrity in the UCLA Student Conduct Code: http://www.deanofstudents.ucla.edu/Student-Conduct-Code

If you engage in these types of unacceptable behaviors in our course, then you will receive a zero as your score for that assignment. If you are caught cheating on an exam, then you will receive a score of zero for the entire exam. These allegations will be referred to the Office of the Dean of Students and can lead to formal disciplinary proceedings. Being found responsible for violations of academic integrity can result in disciplinary actions such as the loss of course credit for an entire term, suspension for several terms, or dismissal from the University. Such negative marks on your academic record may become a major obstacle to admission to graduate, medical, or professional school.

We cannot make exceptions to our campus' policy on academic integrity, and as we hopefully have communicated effectively here, penalties for violations of this policy are harsh. Please do not believe it if you hear that "everyone does it". The truth is, you usually don't hear about imposed disciplinary actions because they are kept confidential. So our advice, just don't do it! Let's embrace what it means to be a true Bruin and together be committed to the values of integrity.

By submitting my assignments and exams for grading in this course, I acknowledge the above-mentioned terms of the UCLA Student Code of Conduct, declare that my work will be solely my own, and that I will not communicate with anyone other than the instructor and proctors in any way during the exams.

2. Submit a copy of your solutions using this form:

Please upload all work using this form.

The submission uses Google Forms which requires you to be signed into a Google account and will send a confirmation email when the form and your uploads are successfully submitted. If you do not receive a confirmation email or have any other issues please email support@kudu.com. There are free apps that allow you to use your phone camera to scan to PDF or you can use a printer with a scanner. If you are not able to do this you can take photos of your work with your phone and upload them directly or email the files to yourself, download them on your computer then upload them with the Google Form. You can upload up to 10 images at a time.

If the work you submit via the form is correct, or very nearly correct, I may opt to give you a point back where Kudu would otherwise mark you as wrong, which is why it is important to submit your solutions (neatly, organized, and readable) and show all of your work.

Any numbered solutions (not multiple choice problems) on Kudu that do not have accompanying work justifying your answer I may mark as wrong, even if Kudu marks you as correct, which is why it is important to submit your solutions (neatly, organized, and readable) and show all of your work.

When you submit your written solutions via the form, the multiple choice questions need to have the text of the answer in the written work, not just "A, B, C" etc. The reason is that Kudu displays the options in a random order to students, so the letters alone won't mean much.

3. General instructions

- For any technical issues, please contact support@kudu.com They will respond promptly.
- Your numerical answer must be within 5% of the correct answer to be counted.
- The grade will not depend on the number of significant digits you provide.
- You have only one attempt for each problem - make sure the answer you submit is your final answer.
- In all problems, neglect air resistance, unless instructed otherwise.
- Written solutions showing work and all necessary derivations must be uploaded in addition to submission of numerical answers.
- Multiple choice questions need to have the text of the answer in the written work uploaded, not just "A, B, C" etc.

If you have questions during the active exam time, please email me (ntung@physics.ucla.edu) and all the lecture TAs ('EBRYANTO SOEMARDY' <esoemardy215@g.ucla.edu>; 'Aaron John Sabu' <aaronjs@g.ucla.edu>) and one or more of us will get back to you ASAP. For technical question about Kudu itself, please contact support and support@kudu.com.

> Please note the questions below can be edited and changed by your instructor. The printed version is NOT guaranteed to match the online version at a later stage.

Homework Questions

Q1   (1 points)

During a short time-interval the speed v in m/s of a car is given by

$$v = at^6 - \frac{1}{b},$$

where the time t is in seconds. The units of a and b are respectively:

Select the correct answer

○ m/s^2, unitless (no units)

○ $m/s^5, m/s$

○ $m/s^6, s/m$

○ $m/s^6, m/s$

○ $m/s^7, s/m$

Q2   (1 points)

If you throw an object downward in the absence of air resistance, its downward
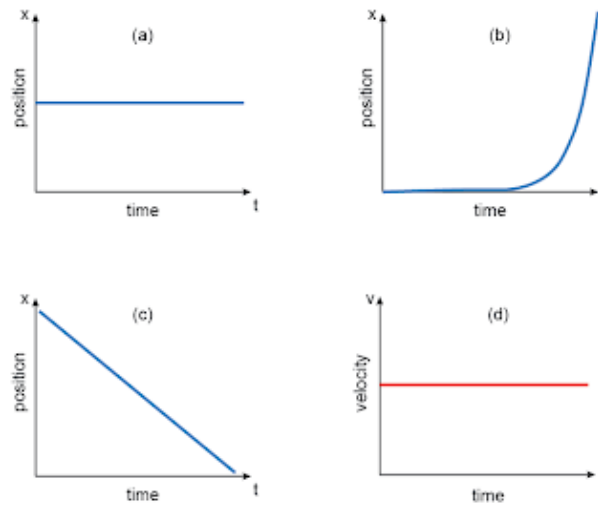acceleration after release is

Select the correct answer

○ less than 9.8 m/s^2

○ greater than 9.8 m/s^2

○ exactly equal to 9.8 m/s^2

Q3   (1 points)

An object is moving with constant, non-zero velocity. Which of the following graphs could represent this motion?

Image size: s **M** L **Max**

Select the correct answer

○ b only

○ c only

○ a only

○ c and d

○ d only

Q4   (1 points)

A particle moves along the x-axis. If the particle's speed is increasing, which of the following could be a true statement?

Select the correct answer

○ the acceleration and velocity could be: negative and positive, respectively

○ the acceleration and velocity could be: zero and positive, respectively

○ the acceleration and velocity could be: negative and negative, respectively

○ the acceleration and velocity could be: positive and negative, respectively

Q5

This question contains multiple parts. Make sure to read all the instructions and answer each part.

Consider the motion of a projectile in the absence of air drag.

Part a   (1 points)

True or False. The acceleration of gravity affects the velocity of a projectile in the horizontal x-direction.

Select the correct answer

○ False

○ True

Part b   (1 points)

True or False. The horizontal speed of a projectile affects the acceleration of gravity acting on the projectile.

Select the correct answer

○ False

○ True

Q6   (1 points)

The trajectory (or path) of a projectile in the absence of air drag traces out what kind of shape?

Select the correct answer

○ Part of an ellipse

○ Part of a circle

○ Part of a parabola

○ A straight line

○ Part of a hyperbola

○ Part of an inverted astroidal cartesian hypotrochoid spiral

Q7

This question contains multiple parts. Make sure to read all the instructions and answer each part.

Part a   (1 points)

If $\vec{A} = 5\hat{i} + 3\hat{j}$ and $\vec{B} = -2\hat{i} + 4\hat{j}$, what is vector $\vec{C} = \vec{A} + 2\vec{B}$?

Select the correct answer

○ $4\hat{i} + 0\hat{j}$

○ $3\hat{i} + 7\hat{j}$

○ $9\hat{i} + 11\hat{j}$

○ $3\hat{i} - 1\hat{j}$

○ $7\hat{i} + 11\hat{j}$

○ $1\hat{i} + 11\hat{j}$

Part b   (1 points)

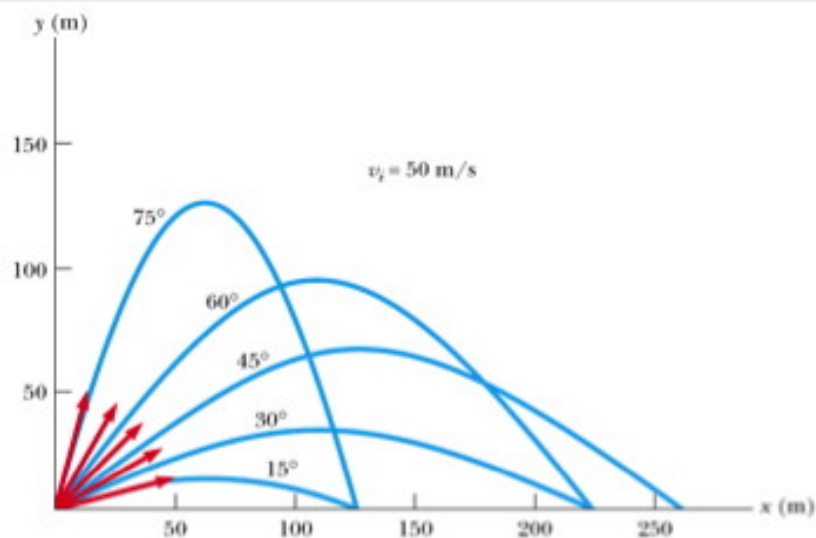What is the magnitude of the vector $\vec{C} = \vec{A} + 2\vec{B}$?

Please enter a numerical answer below. Accepted formats are numbers or "e" based
scientific notation e.g. 0.23, -2, 1e6, 5.23e-8

Q8   (1 points)

Wonder Woman makes several jumps into the air on level ground. Which launch angle in the figure below will give Wonder Woman the longest air time?

Image size: s **M** L **Max**

Select the correct answer

○ 60°

○ 45°

○ 75°

○ 15°

○ 30°

Q9   (1 points)

Batman throws a batarang (a projectile) at a 45.0° angle. When the batarang lands on

the the ground, it will have a horizontal displacement of 67.9 m.   What is the initial speed of the batarang? (You may neglect the effect of the air, and assume that the batarang is thrown from perfectly level ground.)

Please enter a numerical answer below. Accepted formats are numbers or "e" based scientific notation e.g. 0.23, -2, 1e6, 5.23e-8
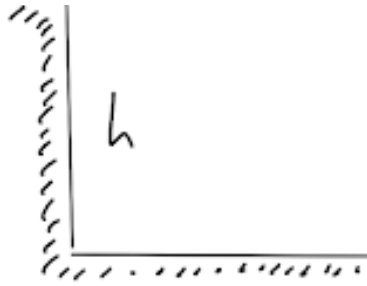
Q10   (1 points)

A pokeball is thrown off a tower at an angle θ=31.4 degrees above horizontal. The height of the tower is h=87.8 m. The initial speed of the pokeball is v=8.86m/s. How long after the release does the pokeball hit the ground below the tower?

Image size: s M L **Max**

Please enter a numerical answer below. Accepted formats are numbers or "e" based
scientific notation e.g. 0.23, -2, 1e6, 5.23e-8

Q11

A mouse runs on the floor following a path described by the equations $y = Ax^2$ and $x = Bt^3$, where
A=2.11 m^{-1},
B=2.09 m/s^3,
and t is time.   Find the following quantities when t=0.548 s.

Part a   (1 points)

The y position.

Part b   (1 points)

The x position.

Part c   (1 points)

The displacement.

Q12

The velocity as a function of time for an object moving in 1-dimensional motion along

the x-axis is given by $v(t) = at^4 - bt^3$, where a and b are constants. The object starts at the origin at time $t = 0$.

Part a   (1 points)

Which of the following is the correct expression for the position as a function of time.

Select the correct answer

○ $4at^5 - 3bt^4$

○ $\frac{1}{2}at^2 + v_o t$ ⬤

○ $\frac{a}{5}t^5 + \frac{b}{4}t^4$ ⬤

○ $4at^3 - 3bt^2$

○ $4at^3 + 3bt^2$

○ $\frac{a}{5}t^5 - \frac{b}{4}t^4$ ⬤

Part b   (1 points)

Which of the following is the correct expression for the acceleration as a function of time.

Select the correct answer

○ $4at^5 - 3bt^4$

○ $\frac{a}{5}t^5 + \frac{b}{4}t^4$ ⬤

○ $4at^3 + 3bt^2$

○ $9.8 \, m/s^2$

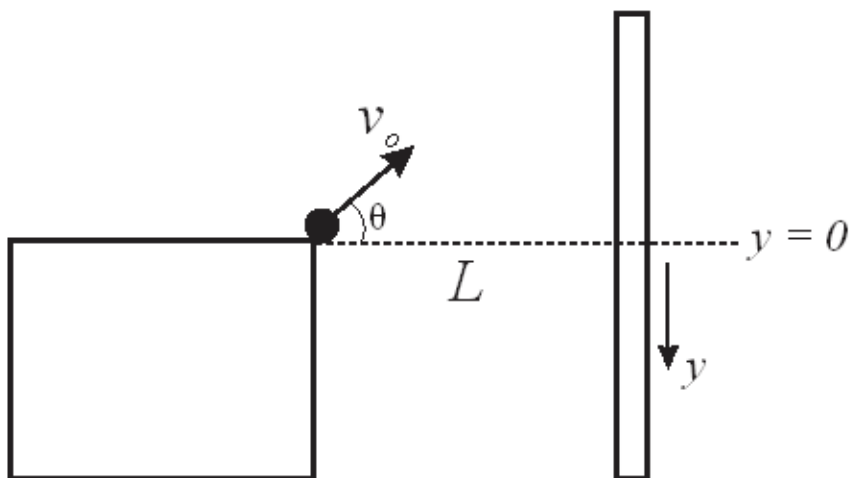$\bigcirc$ $\frac{a}{5}t^5 - \frac{v}{4}t^4$ ⬤

$\bigcirc$ $4at^3 - 3bt^2$

Q13

This question contains multiple parts. Make sure to read all the instructions and answer each part.

A ball is thrown from the from the edge of a table toward vertical wall a distance $L = 22.7$ m away. The ball is launched at angle $\theta = 44.9$ degrees above horizontal with a speed $v_o = 22.8$ m/s.

Image size: s M L **Max**

Part a

(1 points)

What is the final y-position of the ball when it strikes the opposite wall?

Take $y = 0$ as the top of the table and treat downwards as the positive y-direction.

Please enter a numerical answer below. Accepted formats are numbers or "e" based

Part b   (1 points)

What is the final y-position of the ball when it strikes the opposite wall if the ball is launched horizontally to the right?

Take $y = 0$ as the top of the table and treat downwards as the positive y-direction.

Please enter a numerical answer below. Accepted formats are numbers or "e" based scientific notation e.g. 0.23, -2, 1e6, 5.23e-8

Part c   (1 points)

How does the final height of the ball in part b) change if the initial speed is doubled?

Select the correct answer

○ The new height is 4 times lower.

○ The new height is 2 times higher.

○ The new height is $\sqrt{2}$ times higher.

○ The new height is $\sqrt{2}$ times lower.

○ The new height is 4 times higher.

○ The new height is 2 times lower.