This print-out should have 11 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

PLEASE REMEMBER THAT YOU MUST CARRY OUT YOUR CALCULATIONS TO AT LEAST THREE SIGNIFICANT FIGURES. YOUR ANSWER MUST BE WITHIN ONE PERCENT OF THE CORRECT RESULT TO BE MARKED AS CORRECT BY THE SERVER.

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001 (part 1 of 2) 5 points

The cartesian coordinates of a point in the xy plane are $x = -2.64$ m, $y = -4.65$ m.

Find the distance, r, from the point to the origin. Answer in units of m.

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002 (part 2 of 2) 4 points

Calculate the angle θ between the radius-vector of the point and the positive x axis (measured counterclockwise from the positive x axis, within the limits of -180° to $+180^\circ$). Answer in units of $^\circ$.

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003 (part 1 of 2) 5 points

A descent vehicle landing on the moon has a vertical velocity toward the surface of the moon of 29.7 m/s. At the same time, it has a horizontal velocity of 58.9 m/s.

a) At what speed does the vehicle move along its descent path? Answer in units of m/s.

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004 (part 2 of 2) 4 points

b) At what angle with the vertical is its path? Answer in units of $^\circ$.

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005 (part 1 of 2) 5 points

Vector $\vec{B}$ has x, y, and z components of 9.7, 5.9, and 6 units, respectively.

Calculate the magnitude of $\vec{B}$.

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006 (part 2 of 2) 4 points

What is the angle between $\vec{B}$ and the x- axis? Answer in units of $^\circ$.

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007 (part 1 of 2) 5 points

Two vectors $\mathbf{A}$ and $\mathbf{B}$, are lying in the xy plane and given by

$$\mathbf{A} = A_x\,\mathbf{i} + A_y\,\mathbf{j}$$
$$\mathbf{B} = B_x\,\mathbf{i} + B_y\,\mathbf{j}\,.$$

where $A_x = 3.78$ m, $A_y = 0.0594$ m, $B_x = 6.4$ m, $B_y = -5.05$ m. Let $\mathbf{R} = \mathbf{A} + \mathbf{B}$.

Find the magnitude of $\mathbf{R}$. Answer in units of m.

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008 (part 2 of 2) 4 points

Find the angle θ that the vector $\mathbf{R}$ makes from the positive x axis. Choose your answer to be between -180° and $+180^\circ$. The positive angular direction is counter clockwise measured from the x axis. Answer in units of $^\circ$.

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009 (part 1 of 2) 5 points

The vectors $\vec{A}$ and $\vec{B}$ are given by

$$\vec{A} = 2.24\,\hat{\imath} + 3.08\,\hat{\jmath}$$
$$\vec{B} = -1.72\,\hat{\imath} + 4.3\,\hat{\jmath}$$

Find the scalar product $\vec{A} \cdot \vec{B}$.

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010 (part 2 of 2) 4 points

Find the angle between $\vec{A}$ and $\vec{B}$. Answer in units of $^\circ$.

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011 (part 1 of 1) 5 points

Given: Two vectors

$$\vec{A} = A_x\,\hat{\imath} + A_y\,\hat{\jmath}$$

and

$$\vec{B} = B_x\,\hat{\imath} + B_y\,\hat{\jmath}\,,$$

where $A_x = -4$, $A_y = 1$, $B_x = 4$, and $B_y = 4$.

Find the z component of $\vec{A} \times \vec{B}$.