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|  | **Create a vector (name it vecA) that has 14 elements of which the first is 49, the increment is –3, and the last element is 10. Then, using the colon symbol, create a new vector (call it vecB) that has 8 elements. The first 4 elements arethe first 4 elements of the vector vecA, and the last 4 are the last 4 elements of the vector vecA.** |
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|  | **In the triangle shown .**  **Define and as variables, and then:**   1. **Calculate the angle α (in degrees) by substituting the variables in the Law of Cosines.**   **(Law of Cosines: )**   1. **Calculate the angles and (in degrees).** 2. **Check that the sum of the angles is 180O .** |
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| **3.** | **Energy stored in a Spring:**  **The force reqired to compress a linear spring is given by**    **Where F is the force in newtons and k is the spring constant in newtons/m. the potential energy stored in the compressed spring is given by the equation**  **Where E is the energy in Joules. The following information is available for four springs:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Parameter** | **Spring-1** | **Spring-2** | **Spring-3** | **Spring-4** | | **Force (N)** | **20** | **30** | **25** | **20** | | **Spring constant k (N/m)** | **200** | **250** | **300** | **400** |   **Determine the compression of each spring, and the potential energy stored in each spring. Which spring has the most energy stored in it.** |
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| **4.** | **Calculate the distance between two points P1(x1,y1,z1) and P2(x2,y2,z2) in three dimensional coordinate system. Use good programming practices in your program. Test the results for at least three different cases.** |
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| **5.** | **Engineers often measure the ratio of two power measurements in decibels, or dB.**  **Where P2 is the power level being measured, and P1 is some reference power level.**   1. **Assume that the reference power level P1 is 1milliwatt, and write a program that accepts an input power P2 and coverts it into dB w.r.t. the 1mW reference level. (Engineers have a special unit for dB power levels w.r.t. 1mW reference: dBm)** 2. **Write a program that creates a plot of power in watts versus power in dBm with respect to a 1mW reference level. Create both a linear plot and a log-linear xy plot.** |
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| **6.** | **A 3X3 set of linear equations takes the form of**  **Which can be expressed as**    **Where A is a 3X3 input coeffeicient matrix, B is the 3X1 output coefficient matrix.**  **Determine the solution of the linear equations (X) using linear algebra.**  **(Prompt the user to give input coefficients and output coefficients, then find the solution and validate your result)** |
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| **7.** | **Generate two sinusoidal waveforms having frequency 1Khz and variable amplitude in a single figure window. The amplitude of the two waveforms are 2 volts and 3 volts respectively. Assign different color, line width, line style and marker for those two graphs and compare them.** |
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