Chap 12 HW -- Vectors (11708639)

Due: Fri, May 31, 2019 12:00 AM MST

| Question | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 |

◄   ►

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1.   Question Details   SCalcET8 12.1.001. [3799189]

Suppose you start at the origin, move along the x-axis a distance of 5 units in the positive direction, and then move downward along the z-axis a distance of 6 units. What are the coordinates of your position?

$(x, y, z) = \Big($ ⬚ $\Big)$

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2.   Question Details   SCalcET8 12.1.003.MI. [3799354]

Use the given points to answer the following questions.

$A(-4, 0, -3)$, $B(3, 1, -7)$, $C(1, 3, 2)$

Which of the points is closest to the yz-plane?

○ A

○ B

○ C

Which point lies in the xz-plane?

○ A

○ B

○ C

---

3.   Question Details   SCalcET8 12.1.004. [3798633]

Consider the point.

(2, 5, 6)

What is the projection of the point on the *xy*-plane?

$(x, y, z) = \left(\boxed{}\right)$

What is the projection of the point on the *yz*-plane?

$(x, y, z) = \left(\boxed{}\right)$

What is the projection of the point on the *xz*-plane?

$(x, y, z) = \left(\boxed{}\right)$

Draw a rectangular box with the origin and (2, 5, 6) as opposite vertices and with its faces parallel to the coordinate planes. Label all vertices of the box.
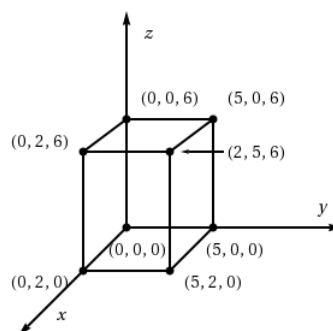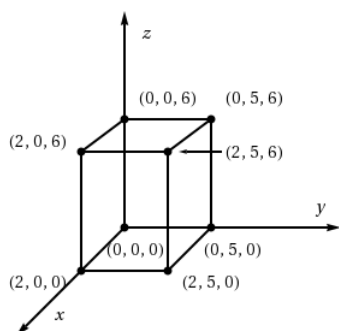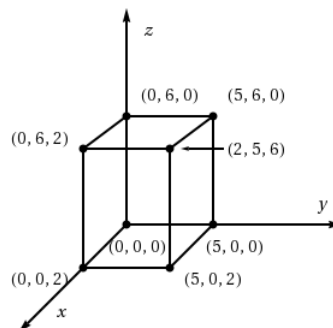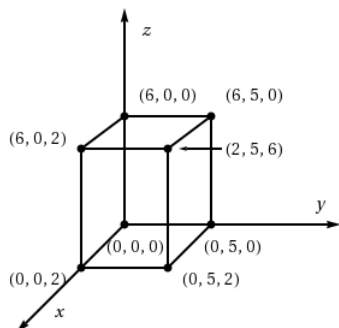
Find the length of the diagonal of the box.

$\boxed{}$

4.   Question Details   SCalcET8 12.1.005. [3798405]   -

What does the equation $x = 8$ represent in $\mathbb{R}^2$?

   ◯ a point

   ◯ a line

   ◯ a plane

   ◯ a circle

What does it represent in $\mathbb{R}^3$?

   ◯ a point

   ◯ a line

   ◯ a plane

   ◯ a circle

---

5.   Question Details   SCalcET8 12.1.009. [3800551]   -

Find the lengths of the sides of the triangle PQR.

$$P(2, -2, -1), \quad Q(6, 0, 3), \quad R(8, -4, -1)$$

$|PQ|$ = [   ]

$|QR|$ = [   ]

$|RP|$ = [   ]

Is it a right triangle?

   ◯ Yes

   ◯ No

Is it an isosceles triangle?

   ◯ Yes

   ◯ No

---

6.   Question Details   SCalcET8 12.1.015.MI. [3800022]   -

Find an equation of the sphere that passes through the point $(6, 5, -1)$ and has center $(5, 8, 3)$.

[   ]

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7.   Question Details   SCalcET8 12.1.018. [3945541]   -

Write the equation of the sphere in standard form.

$$x^2 + y^2 + z^2 + 8x - 8y + 6z + 37 = 0$$

[   ]

Find its center and radius.

center (x, y, z) = ([   ])

radius   [   ]

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8.   Question Details   SCalcET8 12.1.031. [3800355]   -

Describe in words the region of $\mathbb{R}^3$ represented by the equation(s).

$x^2 + y^2 = 25, z = -1$

Because $z = -1$, all points in the region must lie in the [---Select--- ▼] plane $z = -1$. In addition, $x^2 + y^2 = 25$, so the region consists of all points that lie on [---Select--- ▼] and center on the [? ▼]-axis that is contained in the plane $z = -1$.

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9.   Question Details   SCalcET8 12.1.032. [3800654]   -

Describe in words the region of $\mathbb{R}^3$ represented by the equation.

$x^2 + y^2 = 9$

Here $x^2 + y^2 = 9$ with no restrictions on [? ▼], so a point in the region must lie on a circle of radius [_____], center on the [? ▼]-axis, but it could be in any horizontal plane [? ▼] $= k$ (parallel to the [? ▼]-plane). Thus the region consists of all possible circles $x^2 + y^2 = 9$, [? ▼] $= k$ and is therefore a [---Select--- ▼] with radius [_____] whose axis is the [? ▼]-axis.

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10.   Question Details   SCalcET8 12.1.040. [3800006]   -

Write an inequality to describe the region.

The solid cylinder that lies on or below the plane $z = 9$ and on or above the disk in the xy-plane with center the origin and radius 2

○ $x^2 + y^2 \leq 2, 0 \leq z \leq 9$

○ $x^2 + y^2 \leq 4, 0 \leq z \leq 9$

○ $x^2 + y^2 + z^2 \leq 9, 0 \leq z \leq 2$

○ $x^2 + y^2 + z^2 \leq 4, 0 \leq z \leq 9$

○   none of these

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11.   Question Details   SCalcET8 12.1.041. [3800539]   -

Write an inequality to describe the region.

The region consisting of all points between (but not on) the spheres of radius r and R centered at the origin, where $r < R$

○ $r^2 < x^2 + y^2 + z^2 < R^2$

○ $r^2 \leq x^2 + y^2 + z^2 \leq R^2$

○ $R^2 < x^2 + y^2 + z^2 < r^2$

○ $r^2 < \sqrt{x^2 + y^2 + z^2} < R^2$

○   none of these

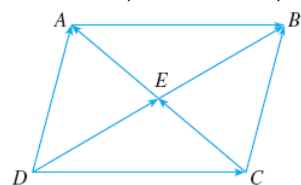**12.**   Question Details   SCalcET8 12.1.501.XP.MI. [3800735]   -

Find an equation of a sphere if one of its diameters has endpoints $(3, 3, 5)$ and $(5, 5, 7)$.

[_____]

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13.   Question Details   SCalcET8 12.2.003. [3800262]

Name all the equal vectors in the parallelogram shown.

$\overrightarrow{AB}$ is equal to _____?

- ⚪ $\overrightarrow{CB}$
- ⚪ $\overrightarrow{DC}$
- ⚪ $\overrightarrow{CE}$
- ⚪ $\overrightarrow{EB}$

$\overrightarrow{DA}$ is equal to _____?

- ⚪ $\overrightarrow{DC}$
- ⚪ $\overrightarrow{EB}$
- ⚪ $\overrightarrow{CE}$
- ⚪ $\overrightarrow{CB}$

$\overrightarrow{DE}$ is equal to _____?

- ⚪ $\overrightarrow{CE}$
- ⚪ $\overrightarrow{CB}$
- ⚪ $\overrightarrow{EB}$
- ⚪ $\overrightarrow{DC}$

$\overrightarrow{EA}$ is equal to _____?

- ⚪ $\overrightarrow{EB}$
- ⚪ $\overrightarrow{DC}$
- ⚪ $\overrightarrow{CB}$
- ⚪ $\overrightarrow{CE}$

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14.   Question Details   SCalcET8 12.2.004. [3799982]

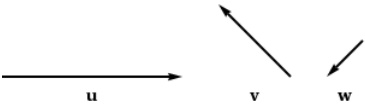Write each combination of vectors as a single vector.
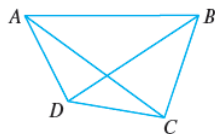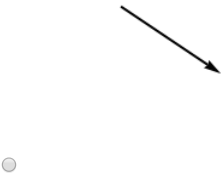

(a) $\overrightarrow{AB} + \overrightarrow{BC}$

(b) $\overrightarrow{CD} + \overrightarrow{DB}$

(c) $\overrightarrow{DB} - \overrightarrow{AB}$

(d) $\overrightarrow{DC} + \overrightarrow{CA} + \overrightarrow{AB}$
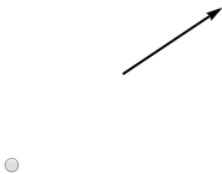
Copy the vectors in the figure and use them to draw the following vectors.

u   v   w

(a)   u + v

○   ○

○   ○

(b)   u + w

○   ○

○   ○

(c)   v + w

○   ○

○   ○
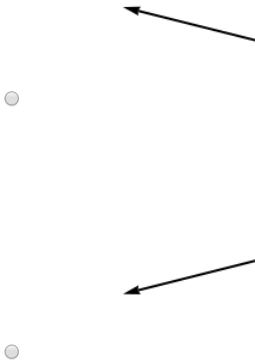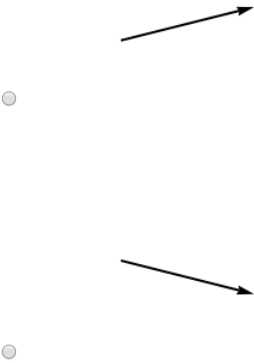
(d)   u − v

○   ○

○   ○
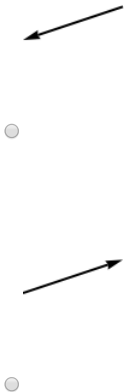
(e)   **v** + **u** + **w**

○   ○

○   ○

(f)   **u** − **w** − **v**

○   ○

○   ○

16.   Question Details   SCalcET8 12.2.016. [3800205]
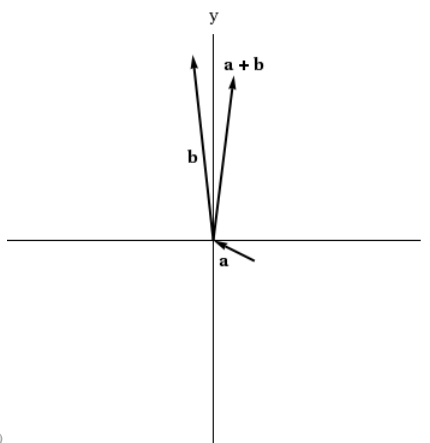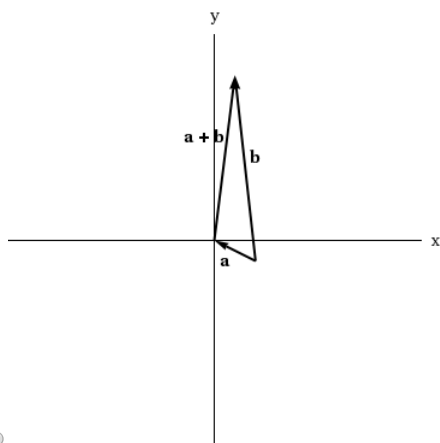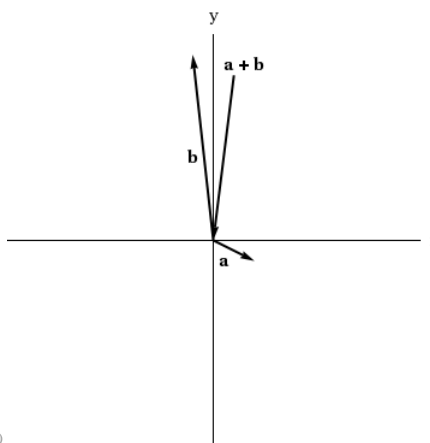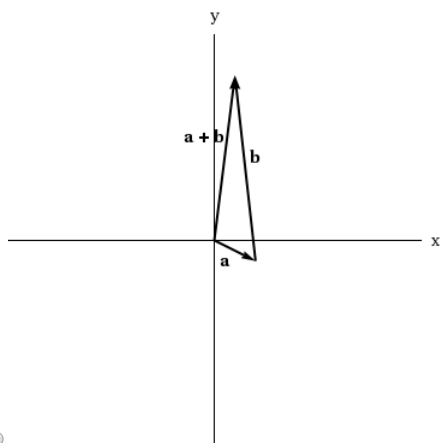
Find the sum of the given vectors.

$$\mathbf{a} = \langle 2, -1 \rangle, \quad \mathbf{b} = \langle -1, 9 \rangle$$

$\mathbf{a} + \mathbf{b} =$ [   ]

Illustrate geometrically.

17.   Question Details   SCalcET8 12.2.019. [3800243]

Find $\mathbf{a} + \mathbf{b}$, $3\mathbf{a} + 9\mathbf{b}$, $|\mathbf{a}|$, and $|\mathbf{a} - \mathbf{b}|$. (Simplify your answer completely.)

$$\mathbf{a} = \langle -3, 4 \rangle, \quad \mathbf{b} = \langle 9, -1 \rangle$$

$\mathbf{a} + \mathbf{b} =$ [   ]

$3\mathbf{a} + 9\mathbf{b} =$ [   ]

$|\mathbf{a}| =$ [   ]

$|\mathbf{a} - \mathbf{b}| =$ [   ]

18.   Question Details   SCalcET8 12.2.024. [3800700]

Find a unit vector that has the same direction as the given vector.

$$-3\mathbf{i} + 2\mathbf{j} - \mathbf{k}$$

[   ]

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19. Question Details   SCalcET8 12.2.026. [3799851]

Find the vector that has the same direction as $\langle 3, 2, -6 \rangle$ but has length 5.

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20. Question Details   SCalcET8 12.3.002. [3799889]

Find $\mathbf{a} \cdot \mathbf{b}$.

$$\mathbf{a} = \langle 9, -4 \rangle, \quad \mathbf{b} = \langle 5, 8 \rangle$$

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21. Question Details   SCalcET8 12.3.005. [3799712]

Find $\mathbf{a} \cdot \mathbf{b}$.

$$\mathbf{a} = \left\langle 5, 1, \frac{1}{4} \right\rangle, \quad \mathbf{b} = \langle 9, -5, -8 \rangle$$

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22. Question Details   SCalcET8 12.3.007. [3800731]

Find $\mathbf{a} \cdot \mathbf{b}$.

$$\mathbf{a} = 2\mathbf{i} + \mathbf{j}, \quad \mathbf{b} = \mathbf{i} - 7\mathbf{j} + \mathbf{k}$$

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23. Question Details   SCalcET8 12.3.009. [3799871]

Find $\mathbf{a} \cdot \mathbf{b}$.

$$|\mathbf{a}| = 3, \quad |\mathbf{b}| = 8, \quad \text{the angle between } \mathbf{a} \text{ and } \mathbf{b} \text{ is } 30°.$$

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24. Question Details   SCalcET8 12.3.010. [3800424]

Find $\mathbf{a} \cdot \mathbf{b}$.

$$|\mathbf{a}| = 80, \quad |\mathbf{b}| = 50, \quad \text{the angle between } \mathbf{a} \text{ and } \mathbf{b} \text{ is } 3\pi/4.$$

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25. Question Details   SCalcET8 12.3.015. [3799789]

Find the angle between the vectors. (First find an exact expression and then approximate to the nearest degree.)

$$\mathbf{a} = \langle 7, 4 \rangle, \quad \mathbf{b} = \langle 5, -1 \rangle$$

exact

approximate   °

---

26. Question Details   SCalcET8 12.3.019. [3800416]

Find the angle between the vectors. (First find an exact expression and then approximate to the nearest degree.)

$$\mathbf{a} = 6\mathbf{i} - 7\mathbf{j} + \mathbf{k}, \quad \mathbf{b} = 4\mathbf{i} - \mathbf{k}$$

exact

approximate   °

---

27.   Question Details   SCalcET8 12.3.023. [3800592]

Determine whether the given vectors are orthogonal, parallel, or neither.

   (a) $\mathbf{a} = \langle 9, 6 \rangle$, $\mathbf{b} = \langle -4, 6 \rangle$

     ○ orthogonal

     ○ parallel

     ○ neither

   (b) $\mathbf{a} = \langle 8, 5, -2 \rangle$, $\mathbf{b} = \langle 3, -1, 5 \rangle$

     ○ orthogonal

     ○ parallel

     ○ neither

   (c) $\mathbf{a} = -4\mathbf{i} + 8\mathbf{j} + 12\mathbf{k}$, $\mathbf{b} = 3\mathbf{i} - 6\mathbf{j} - 9\mathbf{k}$

     ○ orthogonal

     ○ parallel

     ○ neither

   (d) $\mathbf{a} = 4\mathbf{i} - \mathbf{j} + 4\mathbf{k}$, $\mathbf{b} = 5\mathbf{i} + 12\mathbf{j} - 2\mathbf{k}$

     ○ orthogonal

     ○ parallel

     ○ neither

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28.   Question Details   SCalcET8 12.3.033. [3800047]

Find the direction cosines and direction angles of the vector. (Give the direction angles correct to the nearest degree.)

     $\langle 3, 1, 4 \rangle$

$\cos(\alpha) =$ [   ]

$\cos(\beta) =$ [   ]

$\cos(\gamma) =$ [   ]

   $\alpha =$ [   ]°
   $\beta =$ [   ]°
   $\gamma =$ [   ]°

---

29.   Question Details   SCalcET8 12.3.035. [3800526]

Find the direction cosines and direction angles of the vector. (Give the direction angles correct to the nearest degree.)

     $\mathbf{i} - 5\mathbf{j} - 3\mathbf{k}$

$\cos(\alpha) =$ [   ]

$\cos(\beta) =$ [   ]

$\cos(\gamma) =$ [   ]

   $\alpha =$ [   ]°
   $\beta =$ [   ]°
   $\gamma =$ [   ]°

---

30.   Question Details   SCalcET8 12.3.038. [3800216]

If a vector has direction angles $\alpha = \pi/4$ and $\beta = \pi/3$, find the third direction angle γ.

$\gamma =$ [   ]

---

31.   Question Details   SCalcET8 12.4.001. [3799833]   -

Find the cross product **a** × **b**.

$$\mathbf{a} = \langle 2, 5, 0 \rangle, \qquad \mathbf{b} = \langle 1, 0, 9 \rangle$$

[   ]

Verify that it is orthogonal to both **a** and **b**.

(**a** × **b**) · **a** = [   ]
(**a** × **b**) · **b** = [   ]

---

32.   Question Details   SCalcET8 12.4.004. [3800772]   -

Find the cross product **a** × **b**.

$$\mathbf{a} = 6\mathbf{i} + 6\mathbf{j} - 6\mathbf{k}, \qquad \mathbf{b} = 6\mathbf{i} - 6\mathbf{j} + 6\mathbf{k}$$

[   ]

Verify that it is orthogonal to both **a** and **b**.

(**a** × **b**) · **a** = [   ]
(**a** × **b**) · **b** = [   ]

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33.   Question Details   SCalcET8 12.4.013. [3799948]

State whether each expression is meaningful. If not, explain why. If so, state whether it is a vector or a scalar.

(a)   **a** · (**b** × **c**)

○   The expression is meaningful. It is a vector.

○   The expression is meaningful. It is a scalar.

○   The expression is meaningless. The cross product is defined only for two vectors.

○   The expression is meaningless. The dot product is defined only for two vectors.

(b)   **a** × (**b** · **c**)

○   The expression is meaningful. It is a vector.

○   The expression is meaningful. It is a scalar.

○   The expression is meaningless. The cross product is defined only for two vectors.

○   The expression is meaningless. The dot product is defined only for two vectors.

(c)   **a** × (**b** × **c**)

○   The expression is meaningful. It is a vector.

○   The expression is meaningful. It is a scalar.

○   The expression is meaningless. The cross product is defined only for two vectors.

○   The expression is meaningless. The dot product is defined only for two vectors.

(d)   **a** · (**b** · **c**)

○   The expression is meaningful. It is a vector.

○   The expression is meaningful. It is a scalar.

○   The expression is meaningless. The cross product is defined only for two vectors.

○   The expression is meaningless. The dot product is defined only for two vectors.

(e)   (**a** · **b**) × (**c** · **d**)

○   The expression is meaningful. It is a vector.

○   The expression is meaningful. It is a scalar.

○   The expression is meaningless. The cross product is defined only for two vectors.

○   The expression is meaningless. The dot product is defined only for two vectors.

(f)   (**a** × **b**) · (**c** × **d**)

○   The expression is meaningful. It is a vector.

○   The expression is meaningful. It is a scalar.

○   The expression is meaningless. The cross product is defined only for two vectors.

○   The expression is meaningless. The dot product is defined only for two vectors.

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34.   Question Details   SCalcET8 12.4.014. [3799753]   -

Find |**u** × **v**| and determine whether **u** × **v** is directed into the screen or out of the screen.

|**v**| = 4

45°

|**u**| = 2
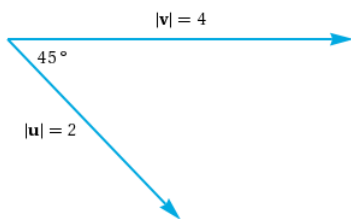
|**u** × **v**| = [_____]

○ **u** × **v** is directed into the screen.

○ **u** × **v** is directed out of the screen.

---

35.   Question Details   SCalcET8 12.4.016. [3800045]   -

The figure shows a vector **a** in the xy-plane and a vector **b** in the direction of **k**. Their lengths are |**a**| = 5 and |**b**| = 2.

z

b

a

x y
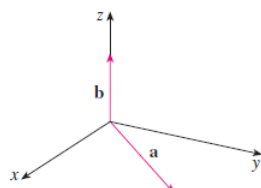
(a) Find |**a** × **b**|.

[_____]

(b) Use the right-hand rule to decide whether the components of **a** × **b** are positive, negative, or 0.

x-component   ---Select--- ▼
y-component   ---Select--- ▼
z-component   ---Select--- ▼

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36.   Question Details   SCalcET8 12.4.017. [3800220]   -

If **a** = ⟨2, −1, 2⟩ and **b** = ⟨4, 2, 1⟩, find the following.

a × **b** = [_____]

b × **a** = [_____]

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37.   Question Details   SCalcET8 12.4.019. [3800377]   -

Find two unit vectors orthogonal to both ⟨7, 2, 1⟩ and ⟨−1, 1, 0⟩.

[_____]   (smaller **i**-value)

[_____]   (larger **i**-value)

Assignment Details

Name (AID): **Chap 12 HW -- Vectors (11708639)**
Submissions Allowed: **15**
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Code:
Locked: **Yes**
Author: **Bird, Brian (** brian.bird@gccaz.edu **)**
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Add Practice Button
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Response
Save Work
After due date
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Key
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Key
Question Part Score
Solution
Mark
Add Practice Button
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