



## Math 151 - Week-In-Review 1

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### Topics for the week:

- 1.5 Inverse Trigonometric Functions
- J.1 Vectors

### 1.5 Inverse Trigonometric Functions

1. State the domain and range of  $f(x) = \arcsin(x)$ ,  $g(x) = \arccos(x)$ , and  $h(x) = \arctan(x)$ .

2. Compute the exact value of each expression.

(a)  $\arcsin(-1)$

(b)  $\arccos\left(\frac{\sqrt{3}}{2}\right)$

(c)  $\arctan(\sqrt{3})$

(d)  $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$

(e)  $\cos^{-1}\left(-\frac{1}{2}\right)$

(f)  $\tan^{-1}(0)$



3. Simplify each expression.

(a)  $\arctan(\cos(\pi))$

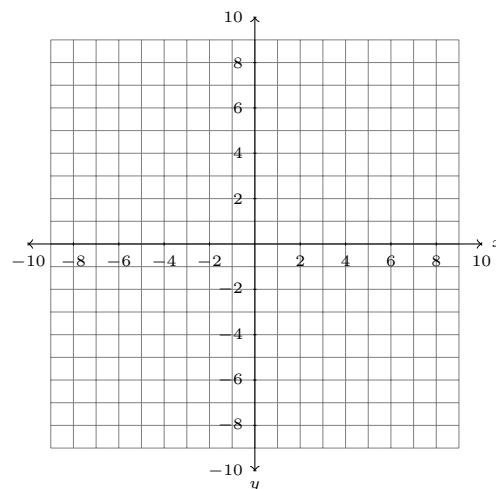
(b)  $\sec\left(\sin^{-1}\left(\frac{8}{13}\right)\right)$

(c)  $\csc\left(\arctan\left(\frac{x}{4}\right)\right)$

(d)  $\sin(\cos^{-1}(3x))$

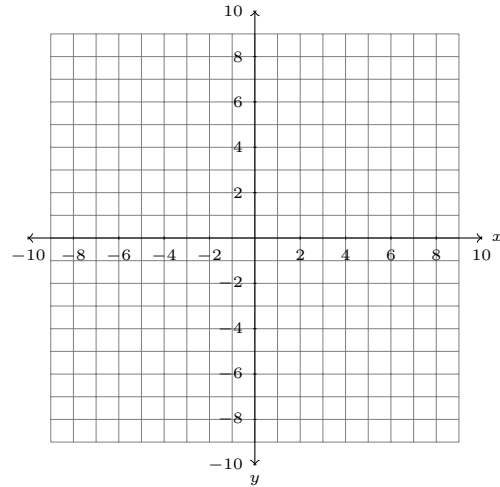
### J.1 Vectors

4. Compute a vector,  $\mathbf{v}$ , which is given by the directed line segment  $\overrightarrow{PQ}$  with points  $P = (-3, 5)$  and  $Q = (-1, -9)$ . Then sketch both the directed line segment  $\overrightarrow{PQ}$  and vector,  $\mathbf{v}$ .





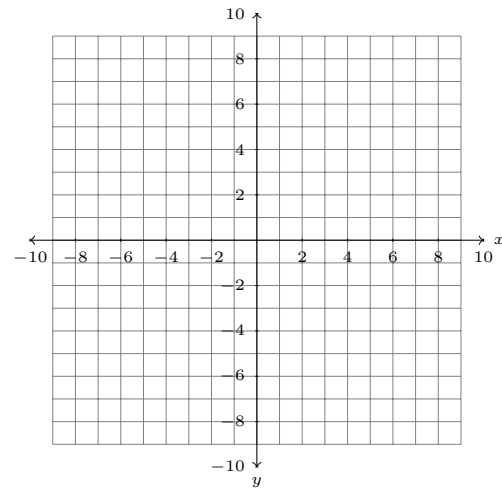
5. Compute a vector,  $\mathbf{w}$ , which is given by the directed line segment  $\overrightarrow{BA}$  with points  $A = \left(\frac{1}{2}, 0\right)$  and  $B = \left(\frac{7}{2}, \frac{7}{2}\right)$ . Then sketch both the directed line segment  $\overrightarrow{BA}$  and vector,  $\mathbf{w}$ .



6. Given vectors  $\vec{u} = \langle 3, -4 \rangle$ ,  $\vec{v} = \langle 6, 11 \rangle$ , and  $\vec{w} = \left\langle -\frac{2}{5}, -\frac{3}{2} \right\rangle$ , compute each of the following.
- (a) The magnitude of  $\vec{u}$ .
  - (b) The length of  $\vec{w}$ .
  - (c)  $\vec{v} - \vec{u}$
  - (d)  $8\vec{w}$
  - (e)  $6\vec{u} + 9\vec{v}$
  - (f)  $-\frac{1}{2}\vec{u} + 4\vec{w} - \frac{2}{5}\vec{v}$



7. Using a graph, show  $\langle -2, -3 \rangle + \langle 0, 8 \rangle$  has the same resultant vector as  $\langle 0, 8 \rangle + \langle -2, -3 \rangle$ .



8. Given vectors  $\mathbf{u} = \mathbf{i} + 3\mathbf{j}$ ,  $\mathbf{v} = -2\mathbf{i}$ , and  $\mathbf{w} = \langle -7, 8 \rangle$ , compute each of the following and write your final answer using the standard basic vectors, if appropriate.

(a) Write  $\mathbf{w}$  using standard basic vectors  $\mathbf{i}, \mathbf{j}$ .

(b)  $|\mathbf{u}|$

(c)  $\mathbf{u} - 2\mathbf{w}$

(d)  $|\mathbf{u} + 3\mathbf{v}|$



9. Given  $\mathbf{a} = -\mathbf{i} + 5\mathbf{j}$ ,

(a) Compute a unit vector that has the same direction as  $\mathbf{a}$ .

(b) Compute a vector that has the same direction as  $\vec{a}$  and has a length of  $\frac{1}{4}$ .

(c) Compute a vector that is parallel to  $\mathbf{a}$  with a length 5.

10. Write the component form of vector,  $\vec{v}$ , whose initial point is the origin of the two dimensional Cartesian Plane and makes an angle of  $\frac{7\pi}{6}$  with the positive  $x$ -axis. The magnitude of  $\vec{v}$  is 5.



11. Two chains have been attached to a chunk of concrete buried in the ground and then each attached to a different backhoe. If the backhoes drive in opposite directions from the concrete with one of the chains creating a  $30^\circ$  angle with the ground and having a magnitude of 120 lbs, while the other creates a  $45^\circ$  angle with the ground and has a magnitude of 100 lbs. What is the resultant force  $\mathbf{F}$  acting on the chunk of concrete? Then compute the magnitude and direction of the force.

12. The wind is blowing at a speed of 18 mph in the direction  $S45^\circ W$ . A red tailed hawk is flying  $N60^\circ W$  at an airspeed of 100 mph. Determine the true course and ground speed of the hawk.



Trigonometric Identity Reminders

13. State the three Pythagorean Identities

14. State the Reciprocal Identities