Pre-Calculus Name: _____

More Practice on Vectors and Parametric Equations

In Exercises 1–6, let $\mathbf{u} = \langle 2, -1 \rangle$, $\mathbf{v} = \langle 4, 2 \rangle$, and $\mathbf{w} = \langle 1, -3 \rangle$ be vectors. Find the indicated expression.

1. $\mathbf{u} - \mathbf{v}$ **2.** $2\mathbf{u} - 3\mathbf{w}$ **3.** $|\mathbf{u} + \mathbf{v}|$ **4.** $|\mathbf{w} - 2\mathbf{u}|$ **5.** $\mathbf{u} \cdot \mathbf{v}$ **6.** $\mathbf{u} \cdot \mathbf{w}$

In Exercises 7–10, let $A = (2, -1)$, $B = (3, 1)$, $C = (-4, 2)$, and $D = (1, -5)$. Find the component form and magnitude of the vector.

7. $3\overrightarrow{AB}$ **8.** $\overrightarrow{AB} + \overrightarrow{CD}$ **9.** $\overrightarrow{AC} + \overrightarrow{BD}$ **10.** $\overrightarrow{CD} - \overrightarrow{AB}$

In Exercises 11 and 12, find **(a)** a unit vector in the direction of AB and **(b)** a vector of magnitude 3 in the opposite direction.

11. $A = (4, 0)$, $B = (2, 1)$ **12.** $A = (3, 1)$, $B = (5, 1)$

In Exercises 13 and 14, find **(a)** the direction angles of $\mathbf{u}$ and $\mathbf{v}$ and **(b)** the angle between $\mathbf{u}$ and $\mathbf{v}$.

13. $\mathbf{u} = \langle 4, 3 \rangle$, $\mathbf{v} = \langle 2, 5 \rangle$ **14.** $\mathbf{u} = \langle -2, 4 \rangle$, $\mathbf{v} = \langle 6, 4 \rangle$

In Exercises 15–20, eliminate the parameter t and identify the graph.

15. $x = 3 - 5t, y = 4 + 3t$

$y = -\frac{3}{5}x + \frac{29}{5}$

line

16. $x = 4 + t, y = -8 - 5t, \ -3 \le t \le 5$

$y = -5x + 12$

line segment

endpts $(1, 7)$ & $(9, -33)$

17. $x = 2t^2 - 3, y = t - 1$

$x = 2(y+1)^2 - 3$

parabola, open right

18. $x = 3\cos t, y = 3\sin t$

$x^2 + y^2 = 9$

circle

$r = 3$

$C = (0, 0)$

19. $x = e^{2t} - 1, y = e^t$

$y = \sqrt{x+1}$

root function

20. $x = t^3, y = \ln t, t > 0$

$y = \ln \sqrt[3]{x}$

log function

In Exercises 31 and 32, find a parametrization for the curve.

21. The line through the points (–1, –2) & (3, 4).

$x = -1 + 4t$
$y = -2 + 6t$

$x = t$
$y = \frac{3}{2}t - \frac{1}{2}$

22. The line segment with endpoints (–2, 3) and (5, 1)

$x = -2 + 7t$
$y = 3 - 2t$
$0 \le t \le 1$

$x = t$
$y = \frac{-2}{7}t + \frac{17}{7}$

23. An airplane is flying on a bearing of 80° at 540 mph. A wind is blowing with the bearing 100° at 55 mph.
(a) Find the component form of the velocity of the airplane.
(b) Find the actual speed and direction of the airplane.

24. An airplane is flying on a bearing of 285°at 480 mph. A wind is blowing with the bearing 265° at 30 mph.
(a) Find the component form of the velocity of the airplane.
(b) Find the actual speed and direction of the airplane.

25. Stewart shoots an arrow straight up from the top of a building with initial velocity of 245 ft /sec. The arrow leaves from a point 200 ft above level ground.
(a) Write an equation that models the height of the arrow as a function of time *t*. $s = -16t^2 + 245t + 200$
(b) Use parametric equations to simulate the height of the arrow. $x = t$
(c) Use parametric equations to graph height against time. $y =$
(d) How high is the arrow after 4 sec? 924 ft
(e) What is the maximum height of the arrow? When does it reach its maximum height? 1134.89 ft
(f) How long will it be before the arrow hits the ground? 7.066 sec
16.1 sec

26. Gretta and Lois are launching yard darts 20 ft from the front edge of a circular target of radius 18 in. If Gretta releases the dart 5 ft above the ground with an initial velocity of 20 ft/sec and at a 50° angle with the horizontal, will the dart hit the target? NO, hits ground around 11.6 ft