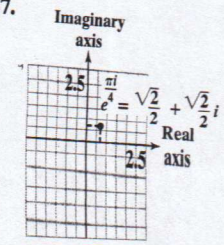
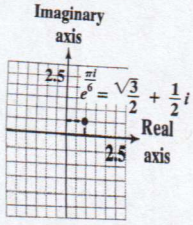
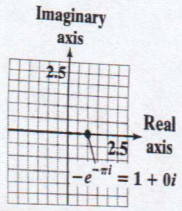
87.



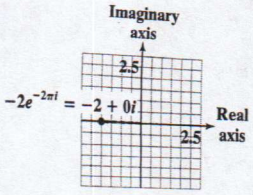
88.



89.

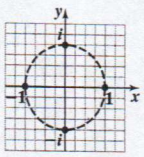


90.



91. a. $i; -1 + i; -i; -1 + i; -i; -1 + i$ **b.** Complex numbers may vary. **92. a.** $-i; -1 - i; i; -1 - i; i; -1 - i$ **b.** Complex numbers may vary.
106. makes sense **107.** does not make sense **108.** makes sense **109.** does not make sense

111.

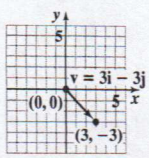


113. Yes, both have length $3\sqrt{5}$. **114.** Yes, both have slope 2. **115.** $8x + 34y$

Section 7.6

Check Point Exercises

1. $\|\mathbf{u}\| = 5 = \|\mathbf{v}\|$ and $m_u = \frac{4}{3} = m_v$ **2.**



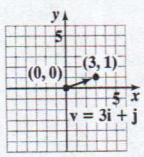
; $\|\mathbf{v}\| = 3\sqrt{2}$ **3.** $\mathbf{v} = 3\mathbf{i} + 4\mathbf{j}$ **4. a.** $11\mathbf{i} - 2\mathbf{j}$ **b.** $3\mathbf{i} + 8\mathbf{j}$

5. a. $56\mathbf{i} + 80\mathbf{j}$ **b.** $-35\mathbf{i} - 50\mathbf{j}$ **6.** $30\mathbf{i} + 33\mathbf{j}$ **7.** $\frac{4}{5}\mathbf{i} - \frac{3}{5}\mathbf{j}$; $\sqrt{\left(\frac{4}{5}\right)^2 + \left(-\frac{3}{5}\right)^2} = \sqrt{\frac{16}{25} + \frac{9}{25}} = \sqrt{\frac{25}{25}} = 1$ **8.** $30\sqrt{2}\mathbf{i} + 30\sqrt{2}\mathbf{j}$
9. 82.55 lb; 46.2°

Exercise Set 7.6

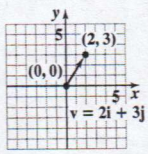
1. a. $\sqrt{41}$ **b.** $\sqrt{41}$ **c.** $\mathbf{u} = \mathbf{v}$ **2. a.** $2\sqrt{13}$ **b.** $2\sqrt{13}$ **c.** $\mathbf{u} = \mathbf{v}$ **3. a.** 6 **b.** 6 **c.** $\mathbf{u} = \mathbf{v}$ **4. a.** 5 **b.** 5 **c.** $\mathbf{u} = \mathbf{v}$

5.



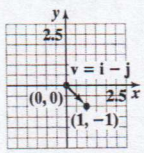
$\sqrt{10}$

6.



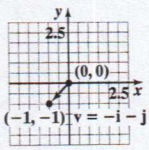
$\sqrt{13}$

7.



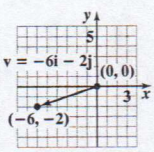
$\sqrt{2}$

8.



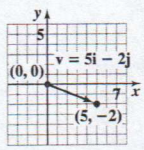
$\sqrt{2}$

9.



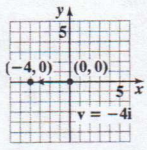
$2\sqrt{10}$

10.



$\sqrt{29}$

11.



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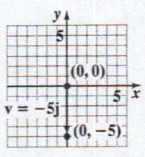
12.



5

13. $10\mathbf{i} + 6\mathbf{j}$ **14.** $-8\mathbf{i} + 11\mathbf{j}$ **15.** $6\mathbf{i} - 3\mathbf{j}$ **16.** $7\mathbf{i} + 2\mathbf{j}$ **17.** $-6\mathbf{i} - 14\mathbf{j}$ **18.** $8\mathbf{i} - 11\mathbf{j}$ **19.** $9\mathbf{i}$ **20.** $8\mathbf{j}$ **21.** $-\mathbf{i} + 2\mathbf{j}$
22. $-4\mathbf{i} + \mathbf{j}$ **23.** $5\mathbf{i} - 12\mathbf{j}$ **24.** $-2\mathbf{i} + 13\mathbf{j}$ **25.** $-5\mathbf{i} + 12\mathbf{j}$ **26.** $2\mathbf{i} - 13\mathbf{j}$ **27.** $-15\mathbf{i} + 35\mathbf{j}$ **28.** $-18\mathbf{i} + 42\mathbf{j}$ **29.** $4\mathbf{i} + 24\mathbf{j}$
30. $7\mathbf{i} + 42\mathbf{j}$ **31.** $-9\mathbf{i} - 4\mathbf{j}$ **32.** $-6\mathbf{i} + 13\mathbf{j}$ **33.** $-5\mathbf{i} + 45\mathbf{j}$ **34.** $5\mathbf{i} - 45\mathbf{j}$ **35.** $2\sqrt{29}$ **36.** $2\sqrt{29}$ **37.** $\sqrt{10}$ **38.** $\sqrt{10}$
39. $\mathbf{i}$ **40.** $-\mathbf{j}$ **41.** $\frac{3}{5}\mathbf{i} - \frac{4}{5}\mathbf{j}$ **42.** $\frac{4}{5}\mathbf{i} - \frac{3}{5}\mathbf{j}$ **43.** $\frac{3\sqrt{13}}{13}\mathbf{i} - \frac{2\sqrt{13}}{3}\mathbf{j}$ **44.** $\frac{2\sqrt{5}}{5}\mathbf{i} - \frac{\sqrt{5}}{5}\mathbf{j}$ **45.** $\frac{\sqrt{2}}{2}\mathbf{i} + \frac{\sqrt{2}}{2}\mathbf{j}$ **46.** $\frac{\sqrt{2}}{2}\mathbf{i} - \frac{\sqrt{2}}{2}\mathbf{j}$
47. $3\sqrt{3}\mathbf{i} + 3\mathbf{j}$ **48.** $4\sqrt{2}\mathbf{i} + 4\sqrt{2}\mathbf{j}$ **49.** $-6\sqrt{2}\mathbf{i} - 6\sqrt{2}\mathbf{j}$ **50.** $35\sqrt{3}\mathbf{i} - 5\mathbf{j}$ **51.** $\approx -0.20\mathbf{i} + 0.46\mathbf{j}$ **52.** $\approx -0.23\mathbf{i} - 0.09\mathbf{j}$
53. $-23\mathbf{i} + 14\mathbf{j}$ **54.** $-33\mathbf{i} + 13\mathbf{j}$ **55.** -60 **56.** -72 **57.** commutative property **58.** associative property
59. distributive property **60.** distributive property **61.** 18.03; 123.7° **62.** 8.25; −76.0° **63.** 6; 90° **64.** 3; 180°
65. $22\sqrt{3}\mathbf{i} + 22\mathbf{j}$ **66.** $15\sqrt{2}\mathbf{i} + 15\sqrt{2}\mathbf{j}$ **67.** $148.5\mathbf{i} + 20.9\mathbf{j}$ **68.** $\approx -258.1\mathbf{i} + 368.6\mathbf{j}$ **69.** $\approx 1.4\mathbf{i} + 0.6\mathbf{j}$; 1.4 in.
70. $1.4\mathbf{i} + 1.2\mathbf{j}$; 1.4 in. **71.** ≈ 108.21 lbs; S 77.4° E **72.** ≈ 6353 lbs; ≈ 1.7° **73.** 2038.28 lb; 162.8° **74.** 85.18 lb; 162.9°
75. ≈ 30.9 lbs **76.** ≈ 97.1 lbs **77. a.** 335 lb **b.** 3484 lb **78. a.** 61 lb **b.** 273 lb **79. a.** $\mathbf{F} = 9\mathbf{i} - 3\mathbf{j}$ **b.** $\mathbf{F}_3 = -9\mathbf{i} + 3\mathbf{j}$
80. a. $\mathbf{F} = 4\mathbf{i} - 10\mathbf{j}$ **b.** $\mathbf{F}_4 = -4\mathbf{i} + 10\mathbf{j}$ **81. a.** $\mathbf{F} = -2\mathbf{j}$ **b.** $\mathbf{F}_5 = 2\mathbf{j}$ **82. a.** $\mathbf{F} \approx -5.62\mathbf{i} + 10.01\mathbf{j}$ **b.** $\mathbf{F}_4 \approx 5.62\mathbf{i} - 10.01\mathbf{j}$
83. a. $\mathbf{v} = 180\cos 40°\mathbf{i} + 180\sin 40°\mathbf{j} \approx 137.89\mathbf{i} + 115.70\mathbf{j}$, $\mathbf{w} = 40\cos 0°\mathbf{i} + 40\sin 0°\mathbf{j} = 40\mathbf{i}$ **b.** $\mathbf{v} + \mathbf{w} \approx 177.89\mathbf{i} + 115.70\mathbf{j}$
c. 212 mph **d.** 33.0°; N 57°E **84. a.** 409 mph **b.** 135.9°; N 45.9°W **85.** 78 mph, 75.4° **86.** 83 mph, 68.8° **104.** makes sense
105. does not make sense **106.** makes sense **107.** does not make sense **108.** false **109.** true **110.** false **111.** true
113. The plane's true speed relative to the ground is about 269 miles per hour.; The compass heading relative to the ground is 278.3°.

114. ≈ 4232.1; ≈ 72.7° **115. a.** 76° **b.** increase **116.** 137.7° **117.** $\frac{7}{5}\mathbf{i} - \frac{21}{5}\mathbf{j}$ **118. a.** $\|\mathbf{u}\|^2 = \|\mathbf{v}\|^2 + \|\mathbf{w}\|^2 - 2\|\mathbf{v}\|\|\mathbf{w}\|\cos\theta$

b. $\|\mathbf{u}\| = \sqrt{(a_1 - a_2)^2 + (b_1 - b_2)^2}$; $\|\mathbf{u}\|^2 = (a_1 - a_2)^2 + (b_1 - b_2)^2$; $\|\mathbf{v}\| = \sqrt{a_1^2 + b_1^2}$; $\|\mathbf{v}\|^2 = a_1^2 + b_1^2$; $\|\mathbf{w}\| = \sqrt{a_2^2 + b_2^2}$;
$\|\mathbf{w}\|^2 = a_2^2 + b_2^2$