

Unit 7 HW Pg. 27

(1) $x=t$ $y=2t-1$
 $y=2x-1$

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

(3) $x=t-2$ $y=\frac{t}{t-2}$
 $t=x+2$
 $y=\frac{x+2}{x+2-2}$
 $y=\frac{x+2}{x}$

(4) $x=t^5$ $y=5 \ln t$
 $t=\sqrt[5]{x}$ $y=5 \ln(\sqrt[5]{x})$
 $y=\ln(\sqrt[5]{x})^5$
 $y=\ln x$

(5) $x(t)=10(\cos 4t)T$
 (a) $y(t)=-16t^2 + 10(\sin 4t)t + 6$

(b) 1.08 sec

(c) 8.18 ft

(d) .37 sec.

(7) (a) $(6, \frac{\pi}{2})$
 $(6 \cos \frac{\pi}{2}, 6 \sin \frac{\pi}{2})$
 $(0, 6)$

(b) $(3, 120)$
 $(3 \cos 120, 3 \sin 120)$

$(-\frac{3}{2}, \frac{3\sqrt{3}}{2})$

(c) $(10, 72)$
 $(10 \cos 72, 10 \sin 72)$
 $(3.1, 9.5)$

(6) (a) $\frac{90 \text{ miles}}{\text{hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 132 \text{ ft/sec.}$

$x = 132T \cos 64$

$y = -16T^2 + 132(\sin 64)T$

(b) 7.4 sec

(c) 219.9 ft.

(d) No falls just short

(8) (a) $(-3, 3)$ (b) $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ (c) $(7, -24)$

$r = 3\sqrt{2}$
 $\theta = 135^\circ$

$(3\sqrt{2}, 135)$

$r = 1$

$\theta = \frac{5\pi}{3}$

$(1, \frac{5\pi}{3})$

$r = 25$

$\theta = \tan^{-1}(\frac{-24}{7})$

$\theta = -73.7^\circ$

$(25, -73.7)$

(9) (a) $5x - y = 7$
 $5r \cos \theta - r \sin \theta = 7$
 $r = \frac{7}{5 \cos \theta - \sin \theta}$

(b) $(x-1)^2 + y^2 = 1$
 $x^2 - 2x + 1 + y^2 = 1$
 $r^2 - 2r \cos \theta = 0$
 $r(r - 2 \cos \theta) = 0$
 $r = 2 \cos \theta$

(c) $x^2 + y^2 + 4x = 0$
 $r^2 + 4r \cos \theta = 0$
 $r(r + 4 \cos \theta) = 0$
 $r = -4 \cos \theta$

(10) (a) $r = 4$
 $r^2 = 16$
 $x^2 + y^2 = 16$

(b) $r = 8 \csc \theta$
 $r = \frac{8}{\sin \theta}$
 $r \sin \theta = 8$
 $y = 8$

(c) $r = \frac{5}{2 \sin \theta - \cos \theta}$
 $2r \sin \theta - r \cos \theta = 5$
 $2y - x = 5$
 $y = \frac{x+5}{2}$

(11) $P(-3, 7)$ $Q(2, -1)$
 $\langle 2 - (-3), -1 - 7 \rangle$
 $\langle 5, -8 \rangle$
 $|v| = \sqrt{5^2 + (-8)^2}$
 $= \sqrt{89}$

(12) $u = \langle 1, -3 \rangle$ $v = \langle 3, 9 \rangle$
 (a) $u + v = \langle 4, 6 \rangle$ (b) $8u - 5v = \langle 8, -24 \rangle - \langle 15, 45 \rangle = \langle -7, -69 \rangle$ (c) $u \cdot v = 1 \cdot 3 + (-3) \cdot 9 = -24$
 (d) $u - v = \langle -2, -12 \rangle$

(e) $\text{proj}_v u = \frac{u \cdot v}{|v|^2} \langle v \rangle$
 $\frac{-24}{90} \langle 3, 9 \rangle$
 $-\frac{4}{15} \langle 3, 9 \rangle$
 $\langle -\frac{4}{5}, -\frac{12}{5} \rangle$

(f) $\langle 1, -3 \rangle = \langle -\frac{4}{5}, -\frac{12}{5} \rangle + ?$
 $-\langle -\frac{4}{5}, -\frac{12}{5} \rangle = \langle \frac{4}{5}, \frac{12}{5} \rangle$
 $? = \langle \frac{9}{5}, \frac{27}{5} \rangle$
 $\langle 1, -3 \rangle = \langle -\frac{4}{5}, -\frac{12}{5} \rangle + \langle \frac{9}{5}, \frac{27}{5} \rangle$
 (g) $\Theta = \cos^{-1} \left(\frac{u \cdot v}{|u||v|} \right) = \cos^{-1} \left(\frac{-24}{\sqrt{10} \sqrt{90}} \right) = 143.1^\circ$

(13) $v = \langle 2, -13 \rangle$
 $|v| = \sqrt{173}$
 $\langle \frac{2}{\sqrt{173}}, \frac{-13}{\sqrt{173}} \rangle$
 $\sqrt{\left(\frac{2}{\sqrt{173}}\right)^2 + \left(\frac{-13}{\sqrt{173}}\right)^2} = 1$

(14) $u = (13, 5)$ and $(-12, 5)$ $v = 8i + 6j$
 $u = \langle -25, 0 \rangle$ $v = \langle 8, 6 \rangle$
 (a) $-2u = \langle 50, 0 \rangle$ (b) $u - 2v = \langle -25, 0 \rangle - \langle 16, 12 \rangle = \langle -41, -12 \rangle$

(15) $|v| = 13$ $\Theta = 60$
 $\langle 13 \cos 60, 13 \sin 60 \rangle$
 $\langle \frac{13}{2}, \frac{13\sqrt{3}}{2} \rangle$

(16) (a) $\langle 375 \cos 130, 375 \sin 130 \rangle$
 (b) $\langle 45 \cos 145, 45 \sin 145 \rangle$
 (c) $\langle -277.9, 313.1 \rangle$
 (d) speed = 418.6 mph
 $\Theta = 131.6^\circ$

(17) $u = \langle 3, -9 \rangle$
 $v = \langle -1, 7 \rangle$

$\text{Proj}_v u = \frac{u \cdot v}{|v|^2} \cdot v$
 $= \frac{3 \cdot (-1) + (-9) \cdot 7}{50} \langle -1, 7 \rangle$
 $\text{Proj}_v u = \langle \frac{33}{25}, -\frac{231}{25} \rangle$
 $u = \text{Proj}_v u + ?$
 $\langle 3, -9 \rangle = \langle \frac{33}{25}, -\frac{231}{25} \rangle + ?$
 $\langle 3, -9 \rangle = \langle \frac{33}{25}, -\frac{231}{25} \rangle + \langle \frac{42}{25}, \frac{6}{25} \rangle$

18. Match each polar equation with its graph below.

K 1) $r = 2.5 + 2.5\sin\theta$

H 2) $r = 3$

M 3) $r = 3.5\sin(3\theta)$

P 4) $r = 4.5\sin(2\theta)$

L 5) $r = 4.5\cos(2\theta)$

A 6) $r = 1.5 + 2\cos\theta$

B 7) $r = -3\sin\theta$

N 8) $r = 2 - \sin\theta$

G 9) $r^2 = 16\sin(2\theta)$

O 10) $r = 4\cos(5\theta)$

E 11) $r = 3.5\cos(3\theta)$

F 12) $r = 2.5 - 2.5\cos\theta$

I 13) $r = 3\cos\theta$

J 14) $r = 1 + 4\sin\theta$

C 15) $r = 4.5\sin(6\theta)$

D 16) $r = \frac{1}{2}\theta$

