MATH 1065 - Chapter 9 Review

9.3 (40) Center $(-1,-1)$, Vertical, $a=2$, $b=1$ $\Rightarrow$ $\boxed{\frac{(x+1)^2}{1}+\frac{(y+1)^2}{4}=1}$

(45) $(x+5)^2+4(y-4)^2=16$

$\frac{(x+5)^2}{16}+\frac{(y-4)^2}{4}=1$

Center $(-5,4)$

$a^2=b^2+c^2$

$16=4+c^2$

$2\sqrt{3}=c$

F: $(-5\pm 2\sqrt{3},4)$

V: $(-9,4)(-1,4)$

$e=\frac{2\sqrt{3}}{4}=\frac{\sqrt{3}}{2}$

(57) V: $(4,3)(4,9)$ F: $(4,8)$

Center $(4,6)$

Vertical

$a=3$

$c=2$

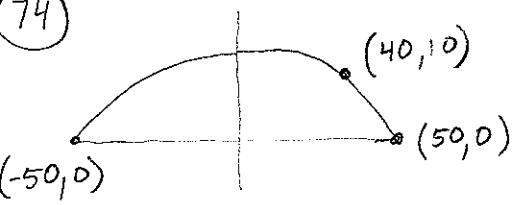
$a^2=b^2+c^2$

$9=b^2+4$

$5=b^2$

$\boxed{\frac{(x-4)^2}{5}+\frac{(y-6)^2}{9}=1}$

(74)



Horizontal

Center $(0,0)$

$a=50$

$\frac{x^2}{50^2}+\frac{y^2}{b^2}=1 \Rightarrow \frac{40^2}{50^2}+\frac{10^2}{b^2}=1 \Rightarrow 1600b^2+250000=2500b^2$

$\frac{2500}{9}=b^2$

$\frac{x^2}{2500}+\frac{9y^2}{2500}=1$

Height at Center $= b = \frac{50}{3}$ or $16.\overline{6}$ ft

9.6 (39) $e=\frac{4}{5}$, Directrix 3 Left of Pole

$r=\frac{\frac{4}{5}(3)}{1-\frac{4}{5}\cos\theta}$ OR $\boxed{r=\frac{12}{5-4\cos\theta}}$

9.R (11) $x^2-4x=2y$

$x^2-4x+4=2y+4$

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

UP $4p=2 \Rightarrow p=\frac{1}{2}$

V: $(2,-2)$

F: $(2,-\frac{3}{2})$

Directrix: $y=-\frac{5}{2}$

(13) $y^2-4y-4x^2+8x=4$

$y^2-4y+4-4(x^2-2x+1)=4+4-4$

$(y-2)^2-4(x-1)^2=4$

$\frac{(y-2)^2}{4}-\frac{(x-1)^2}{1}=1$

$a=2$ $b=1$

$a^2+b^2=c^2$

$4+1=c^2$

$\sqrt{5}=c$

Center $(1,2)$ Vertical

V: $(1,0)(1,4)$

F: $(1,2\pm\sqrt{5})$

Asymp $\boxed{y-2=\pm\frac{2}{1}(x-1)}$

(21) Parabola F: $(-2,0)$ Dir: $x=2$

V: $(0,0)$ $p=-2$ Horizontal (Left)

$\boxed{y^2=-8(x+2)}$

(25) Ellipse F $(\pm 3,0)$ V $(4,0)$

Center $(0,0)$ Horizontal $c=3$ $a=4$

$a^2=b^2+c^2$

$16=b^2+9$

$7=b^2$

$\boxed{\frac{x^2}{16}+\frac{y^2}{7}=1}$

(27) Parabola V: $(2,-3)$ F: $(2,-4)$

Vertical (Down) $p=-1$ $\boxed{(x-2)^2=-4(y+3)}$

(29) Hyperbola, Center $(-2,-3)$, F: $(-4,-3)$, V $(-3,-3)$

Horizontal $c=2$ $a=1$

$a^2+b^2=c^2 \Rightarrow b^2=3$

$1+b^2=4$

$\boxed{\frac{(x+2)^2}{1}-\frac{(y+3)^2}{3}=1}$

(55) $r=\frac{6}{2-\sin\theta} \Rightarrow r=\frac{3}{1-\frac{1}{2}\sin\theta}$

$e=\frac{1}{2}$

$ep=3$

$\frac{1}{2}p=3 \Rightarrow p=6$

Ellipse, Directrix is 6 BELOW POLE

(58) $r=\frac{10}{5+20\sin\theta} \Rightarrow r=\frac{2}{1+4\sin\theta}$

$e=4$

$ep=2$

$4p=2 \Rightarrow p=\frac{1}{2}$

Hyperbola, Directrix is $\frac{1}{2}$ ABOVE POLE

(60) $r=\frac{6}{2-\sin\theta}$

$2r-r\sin\theta=6$

$2r-y=6$

$2r=y+6$

$4r^2=y^2+12y+36$

$4(x^2+y^2)=y^2+12y+36$

$4x^2+4y^2=y^2+12y+36$

$4x^2+3y^2-12y-36=0$

Good to know: $e=\frac{1}{2}$

$4x^2+3(y^2-4y+4)=36+12$

$4x^2+3(y-2)^2=48$

$\frac{x^2}{12}+\frac{(y-2)^2}{16}=1$

9.R (63) $x = 4t - 2$, $y = 1 - t$, $-\infty < t < \infty$ $\Rightarrow t = 1 - y$

$x = 4(1-y) - 2 \Rightarrow x = 4 - 4y - 2 \Rightarrow \boxed{y = -\frac{1}{4}x + \frac{1}{2}}$

$-\infty < x < \infty$

(67) $x = \sec^2 t$, $y = \tan^2 t$, $0 \le t \le \frac{\pi}{4}$

$\sec^2(0) \le x \le \sec^2\left(\frac{\pi}{4}\right)$

$\tan^2 t + 1 = \sec^2 t$

$y + 1 = x$

$\boxed{y = x - 1}$

$1 \le x \le 2$

(83) $x = (V_0 \cos\theta)t \qquad y = -\frac{1}{2}gt^2 + (V_0 \sin\theta)t + h_0$

$x = (80\cos 35^\circ)t \qquad y = -\frac{1}{2}(32)t^2 + (80\sin 35^\circ)t + 6$

a) $\boxed{x \approx 65.53t \qquad y \approx -16t^2 + 45.89t + 6}$

b) Solve $y(t) = 0 \Rightarrow \underline{t = 2.99317 \text{ sec}}$

c) y is maximized at vertex where $y = \frac{-b}{2a}$

$y = \frac{-45.89}{2(-16)} \approx 1.434$ $\boxed{y(1.434) = 38.899}$ (sec, ft)

d) $x(2.99317) \approx 65.53(2.99317) \approx \boxed{196.149 \text{ ft}}$