1) $Y_1 Y_2 \dots Y_n \sim \mathcal{N}(0, Y\tau^2)$	
$f(y 0,1/\tau^2) = \frac{1}{(2\pi y\tau^2)^{1/2}} \exp\left(-\frac{1}{2}(y\tau^2)\right)$	
hikelihood = $\prod_{i=1}^{n} f(y_i)O_i/2^2$	
$= \frac{1}{(2\pi v^2)^{1/2}} \exp\left(-\frac{1}{2} y^2 z^2\right)$	
Likelihood $\propto (T^2)^{n/2}$ exp $(-SSE)$ in terms of sufficient statistic	
SSE = Sn = Zyi ² \(\Rightarrow\) hitelihood depends on Sn.	
b) Show: Gamma is the conjugate prior for z^2 Suppose z^2 or Gamma (α, β) $[+(z^2)=(z^2)^{\alpha-1}e^{-\beta z^2}, \beta^{\alpha}]$	
Then, $\rho(\overline{z^2} y) \propto (\overline{z^2})^{n/2} e^{-\frac{SSE}{2U/7c^2}} \cdot (\overline{z^2})^{n/2} \cdot e^{-\frac{B}{2U/7c^2}} \cdot (\overline{z^2})^{n/2} \cdot e^{-\frac{B}{2U/7c^2}}$	
which is the kurnel of Gamma($x+n$, $\beta+2y^2$)	
z' $t^2 \mid y \mid \propto Gamma\left(\alpha + n, \beta + \frac{zy^2}{2}\right)$	
As the prior Gamma govre a rusult of Posterior Gamma, thus Gamma is a conjugate prior of the	
2. a) $f(y \theta)$, $-\infty < \theta < \infty$ Mean $(y) = e^{-\theta}$ Var $(y) = e^{-\theta} \cdot (e^{-\theta} + 1)$	
$f(y \theta) \propto \frac{e^{\theta}}{(e^{\theta}+1)^{y+1}} \qquad -\infty < 0 < \infty$	
JF prior: TT(0) X JHO)	
$f(y 0) \propto \frac{e^{O}}{(e^{O}+1)^{y+1}}, -\infty < O < O$	
$\ln f(y \theta) \propto \ln e^{\theta} - (y+i) \ln (e^{\theta}+1)$ $\propto \theta - (y+i) \ln (e^{\theta}+1)$	
$\frac{d \ln f(g(\theta))}{d\theta} \propto -(u+1)e^{\theta}$	
$\frac{\partial^2 \ln f(y \theta)}{\partial \theta^2} \propto -\frac{(y+1)\frac{e^{\alpha}}{(e^{\alpha}+1)^2}}{(e^{\alpha}+1)^2}$ $= \left(\frac{\partial^2 \ln f(y \theta)}{\partial \theta^2} \propto -\frac{[(y+1)\frac{e^{\alpha}}{(1+e^{\alpha})^2}]}{(1+e^{\alpha})^2}\right)$	
$-I(O) \times -E[(gti) \frac{e^{\alpha}}{(ite^{\alpha})^{2}}]$	
$I(0) \propto [E(Y) + I] \frac{e^{0}}{(t + e^{0})^{2}}$	
$I(0) \propto \frac{(e^{-\delta}+1)e^{\delta}}{(1+e^{\delta})^2}$	
$I(\theta) \propto \frac{1}{(1+e^{\theta})}$ $I(\theta) \propto I(\theta) \propto \frac{1}{(e^{\theta}+1)^{1/2}}$	
b) <i>プ(</i> P):	
$\pi(\Theta) \propto \sqrt{\frac{1}{(\Theta^{0}+1)}}$, $\pi(\Theta) \approx \frac{1}{(\Theta^{0}+1)}$	
This If is improper as the integral is divergent since $O \in (-\infty, \infty)$ in \mathbb{R} . $\int_{-\infty}^{\infty} T(\sigma) d\sigma = \int_{-\infty}^{\infty} \frac{1}{(e^{\sigma}+1)} d\sigma = \infty$	
3)a) Gruen:	
I = 2 I I I I I	
$\pi/\tau^2(\phi_0) \propto \hat{\pi} + (y_i)\tau^2$	
From Poroblem-1, we have	
From Psoblen-1, we have $ \tau (1/z^2/Q) \propto \tilde{\tau} f(y_i Q) $	
for every $\phi_0 = (y_1, \dots, y_m, m)$ From Psroblem-1, we have	
From Problem-1, we have $\pi/(1/2^2/9) \propto \hat{\pi} f(y_i 9)$ $\propto \left(\frac{\tau_i}{2\pi i}\right)^n \exp\left(-\frac{1}{2}\tau^2 \frac{\hat{x}}{2\pi i}y_i^2\right)$ We see that,	
From Problem-1, we have $\pi(1/2^{2} \Theta) \propto \hat{\pi}(y_{i} \Theta)$ $\propto \left(\frac{\tau}{2\pi}\right)^{n} \exp\left(-\frac{1}{2}\tau^{2} \frac{\hat{x}}{2\pi}y_{i}^{2}\right)$	
From Problem-1, we have $\pi/\sqrt{\tau^2/9} \propto \tilde{\pi} f(y_i \theta)$ $\propto (\frac{\tau}{\sqrt{2\pi}})^n \exp(-\frac{1}{2}\tau^2 \frac{2}{2\pi}y_i^2)$ We see that, $P(0 Y) \propto \pi(\theta y_i, y_i^2, \dots, y_m^n, m) \cdot \tilde{\pi} f(Y_i \theta)$ $\propto \int_{j=1}^{m} f(y_i^n \theta)$ where $M = m+n$	
From Problem-1, we have $\pi(1/\tau^{2} \Theta) \propto \tilde{\pi} f(y_{i} \Theta)$ $\propto \left(\frac{\tau_{i}}{2\pi}\right)^{n} \exp\left(-\frac{1}{2}\tau^{2} \frac{\hat{\beta}}{2\pi}y_{i}^{2}\right)$ We see that, $P(\Theta Y) \propto \pi(\Theta \hat{y}_{i},y_{i}^{2},\dots,y_{m}^{n},m).\tilde{\pi} f(Y_{i} \Theta)$ $\propto \int_{j=1}^{M} f(y_{i}^{n} \Theta)$	
From Problem-1, we have $ \pi(Vz^2/\mathcal{C}) \propto \tilde{f}_1 f(y_1 \theta) $ $ \propto (\frac{1}{(2\pi)}) \exp\left(-\frac{1}{2}z^2 + y_1^2\right) $ We see that, $ P(\Theta Y) \propto \pi(\Theta y_1, y_2, \dots, y_n, m) \cdot \tilde{f}_1 f(Y_1 \theta) $ $ \propto \tilde{f}_1 f(y_1^* \Theta) $ where $M = m + n$ $ y_1^* = y_3 \text{for } j = (m + 1), \dots (m + n) $ Thus, the posterior distribution belongs in some days of distribution as for the one on Problem-i.	
From Problem-1, we have $\pi/\sqrt{z^2/Q} \propto \tilde{\tau} f(y_1 \theta)$ $\propto \left(\frac{1}{2\pi}\right) \exp\left(-\frac{1}{2}\tau^2 \frac{2}{2\pi}y_1^2\right)$ We see that, $P(\Theta Y) \propto \pi(\Theta y_1,y_2^2,\ldots,y_m^2,m).\tilde{\pi}f(Y_i \theta)$ $\propto \tilde{\eta} f(y_1^* \Theta)$ where $M = m+n$ $y_1^* = y_1$ for $j = i,\ldots,m$	
From Problem-1, we have $ \pi(Vz^2/\mathcal{C}) \propto \tilde{f}_1 f(y_1 \theta) $ $ \propto (\frac{1}{(2\pi)}) \exp\left(-\frac{1}{2}z^2 + y_1^2\right) $ We see that, $ P(\Theta Y) \propto \pi(\Theta y_1, y_2, \dots, y_n, m) \cdot \tilde{f}_1 f(Y_1 \theta) $ $ \propto \tilde{f}_1 f(y_1^* \Theta) $ where $M = m + n$ $ y_1^* = y_3 \text{for } j = (m + 1), \dots (m + n) $ Thus, the posterior distribution belongs in some days of distribution as for the one on Problem-i.	
Brom Problem-1, we have $\pi/\sqrt{r^2/\Theta} \propto \frac{1}{\sqrt{2\pi}} f(y_1 \Theta)$ $\propto \left(\frac{T}{\sqrt{2\pi}}\right)^n \exp\left(-\frac{1}{2}\frac{T^2}{\sqrt{2}}\frac{2}{\sqrt{2}}\frac{2}{\sqrt{2}}\right)^n$ We see that, $P(\Theta Y) \propto \pi(\Theta y_1,y_2,\ldots,y_m,m) \cdot \inf_{t=1}^{n} f(Y_t \Theta)$ $\propto \inf_{t=1}^{n} f(y_1^* \Theta)$ where $M=m+n$ $Y_1^*=Y_1$ for $j=1,\ldots,m$ $Y_2^*=Y_{2m}$ for $j=(m\pi),\ldots$ (min Thus, the posterior distribution belongs to some days of distributions as for the one in Problem-1. Therefore, $\pi(U^* \Phi) = \inf_{t=1}^{n} f(y_1^* \Phi)$	
From Problem, we have $\pi(V^{2} 9) \propto \frac{\pi}{\pi} f(y_{1} 9)$ $\propto \left(\frac{\pi}{\sqrt{2}}\right)^{n} \exp\left(-\frac{1}{2}x^{2}\frac{2}{2}y_{1}^{2}\right)$ We see that, $P(\Theta Y) \propto \pi(\Theta y_{1},y_{1}^{2},\ldots,y_{n}^{n},m). \tilde{\Pi}f(Y_{1} \Theta)$ $\propto \tilde{\Pi} f(y_{1} \Theta)$ where Mernen $Y_{1}^{n} = Y_{1}^{n} \text{ for } j=1,\ldots,m$ $Y_{1}^{n} = Y_{1}^{n} \text{ for } j=1,\ldots,m$ $Y_{2}^{n} = Y_{1}^{n} \text{ for } j=1,\ldots,m$ Thus, the description distribution telengs to some days of distribution as for the one in Problem. Thursday, $\Pi(T_{1}^{n} \Phi_{0}) = \tilde{\Pi} f(y_{1}^{n} \Phi_{0})$ $= \tilde{\Pi} - \frac{1}{2\pi n} \exp\left(-\frac{1}{2}x^{2}\frac{2}{2}y_{1}^{n}\right)$ $= \frac{1}{\sqrt{2\pi n}} \exp\left(-\frac{1}{2}x^{2}\frac{2}{2}y_{1}^{n}\right)$ $= \frac{1}{\sqrt{2\pi n}} \exp\left(-\frac{1}{2}x^{2}\frac{2}{2}y_{1}^{n}\right)$	
From Problem-1, we have $\pi(\sqrt{r^2/\Omega}) \propto \tilde{\pi}_{1} \tilde{\pi}_{1}(y; \theta)$ $\propto \left(\frac{r_{1}}{\sqrt{r^2/\Omega}}\right) \approx p\left(\frac{r_{1}}{\sqrt{r^2}}\right)^{\frac{2}{3}} y^{\frac{1}{3}}$ We see that, $P(\theta Y) \propto \pi(\theta y_{1}^{2}, y_{2}^{2}, \dots, y_{m}^{2}, m), \tilde{\pi}_{1}^{2} f(Y_{1}(\theta))$ $\propto \tilde{\pi}_{1}^{2} f(y_{1}^{2} \theta)$ where $M = m + n$ $y_{1}^{2} = y_{1}^{2} fen j = (m\pi)_{r_{1}} \dots (m\pi)$ Thus, the posterior distribution belongs to some class of clustributions as for the one in Groblem-1. Thursfore, $\pi_{1}^{2}(x_{1}^{2}, y_{2}^{2})$ $= \tilde{\pi}_{1}^{2} + \frac{1}{\sqrt{2\pi r^{2}}} \propto p\left(-\frac{1}{2}, \frac{y_{1}^{2}}{\sqrt{r_{2}^{2}}}\right)$	
From Photelem, we have $\pi/\langle z^2 \mid \Omega \rangle \propto \frac{1}{2\pi} \left\{ (y_1 \mid \Omega) \times \frac{1}{2\pi} \left\{ (y_2 \mid \Omega) \times \frac{1}{2\pi} \left\{ ($	
From Problem, we have $T(IC_{\uparrow}(0)) \propto \int_{0}^{\infty} f(y_{1}(0)) \times \int_{0}^{\infty} f(Y_$	
Seem Problem, we have $\pi(1/2^2/2^2) \propto \frac{1}{2^2} \frac{f(y_1 2)}{f(y_1 2)} \times $	
From Problem, we have $T(IC_{\uparrow}(0)) \propto \int_{0}^{\infty} f(y_{1}(0)) \times \int_{0}^{\infty} f(Y_$	
From Problem, we have $T(V^{2}) \otimes C = \{ \{ \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \} \otimes C = \{ \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \} \otimes C = \{ \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \} \otimes C = \{ \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \{ \} \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \} \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ \{ \} \} \}$ $\times \{ \{ \{ \} \otimes C = \{ \{ \} \otimes C = \{ $	
From Problems, we have $\pi(f(x), y) \propto \pi(f(x), y)$ who see that, $f(\theta)(x) \propto \pi(f(y), y) \cdots (y, m) \cdot f(f(x), y)$ who the men $\pi(f(x), y) = m$ $\pi(f(x), y) $	
From Problems, we have $T(A, Q, Q) \times T(A, Q, Q)$ We so that, $P(A, Q, Q) \times T(A, Q, Q,$	
From Problems, we have Therefore \(Appendix for form for f	