Ch.10
5. $\delta_{prec} = \frac{6\pi G}{c^2}\frac{M}{a(1-\epsilon^2)}$ precession per orbit

$= \frac{6\pi(6.67\times10^{-8}\frac{cm^3}{g s^2})(1.99\times10^{33}g)}{(3\times10^{10}cm/s)^2}\frac{1}{a(1-\epsilon^2)}$

$= 2.78\times10^6\frac{1}{a(1-\epsilon^2)}\,cm$

Mercury: $2.78\times10^6 cm \frac{1}{(57.91\times10^{11}cm)(1-0.2056^2)}\frac{100yr}{0.241yr}\cdot\frac{206,265''}{rad}$

$= 42.9''$ per century

Venus: $5.73\times10^{13}\,cm\,yr''\frac{1}{(108.21\times10^{11}cm)(1-0.0\hat{0}68^2)}\frac{1}{0.615yr}$

$= 8.6\hat{2}''$ per century

Earth: $5.73\times10^{13}\,cm\,yr''\frac{1}{(149.60\times10^{11}cm)(1-0.0167^2)(1yr)}$

$= 3.83''$ per century

Ch.12
3. Schwarzschild

$ds^2 = -(1-\frac{2M}{r})dt^2 + (1-\frac{2M}{r})^{-1}dr^2 + r^2(d\theta^2+\sin^2\theta\,d\phi^2)$

$t = v - r - 2M\ln\left|\frac{r}{2M}-1\right|$

$dt = dv - dr - \frac{dr}{\frac{r}{2M}-1} = dv - dr - \frac{2M}{r}\frac{dr}{1-\frac{2M}{r}}$

$= dv - dr\left(1+\frac{\frac{2M}{r}}{1-\frac{2M}{r}}\right)$

$= dv - (1-\frac{2M}{r})^{-1}dr$

$ds^2 = -(1-\frac{2M}{r})dv^2 + (1-\frac{2M}{r})2dvdr(1-\frac{2M}{r})^{-1}$

$-(1-\frac{2M}{r})dr^2(1-\frac{2M}{r})^{-2} + (1-\frac{2M}{r})^{-1}dr^2 + r^2(d\theta^2+\sin^2\theta\,d\phi^2)$

$= -(1-\frac{2M}{r})dv^2 + 2dvdr + r^2(d\theta^2+\sin^2\theta\,d\phi^2)$