Name: KEY	MATH-102	ID: KEY	Term-132	Class-QUIZ-11	Sec: 34(11:00AM) 23(1:10PM)

1) Evaluate the improper integral $\int_0^4 \frac{dx}{\sqrt{4-x}}$.

The function is not defined at $x=4$

so $\int_0^4 \frac{dx}{\sqrt{4-x}} = \lim_{t\to 4^-} \int_0^t \frac{dx}{\sqrt{4-x}}$

$$\int_0^t \frac{dx}{\sqrt{4-x}} = \int_0^t (4-x)^{-1/2}\,dx = \left[-\frac{(4-x)^{1/2}}{1/2}\right]_0^t = \left[-2\sqrt{4-x}\right]_0^t$$

$$= -2(4-t)^{1/2} + 4.$$

$$\int_0^4 \frac{dx}{\sqrt{4-x}} = \lim_{t\to 4^-}\left[-2(4-t)^{1/2}+4\right] = 4$$

2) Determine whether the improper integral is convergent or divergent

$$\int_1^\infty \frac{\sqrt{x+1}}{x^2}\,dx$$

use limit Comparison test with $\int_1^\infty \frac{1}{x^{3/2}}\,dx$

also it is known that $\int_1^\infty \frac{dx}{x^{3/2}}$ is convg $(P>1)$

$$L = \lim_{x\to\infty} \frac{\frac{\sqrt{x+1}}{x^2}}{1/x^{3/2}} = \lim_{x\to\infty}\left(\frac{\sqrt{x+1}}{x^2}\cdot\frac{x^{3/2}}{1}\right) = \lim_{x\to\infty}\sqrt{\frac{x+1}{x}}$$

$= 1 \Rightarrow L = 1$. Hence both integrals are convg.