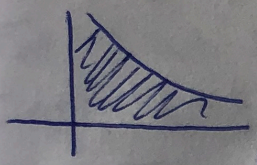
Warm Up:

$\int_8^\infty \frac{1}{x^{1/3}}\,dx$ CVS or DVS?



Sol $\int_8^\infty \frac{1}{x^{1/3}}\,dx =$

$\lim_{t\to\infty}\left[\int_8^t \frac{1}{x^{1/3}}\,dx\right] = \lim_{t\to\infty}\left[\frac{3}{2}x^{2/3}\Big|_8^t\right] =$

$\lim_{t\to\infty}\left[\frac{3}{2}t^{2/3} - \frac{3}{2}(8)^{2/3}\right] = \infty$, so the integral DVS

($t^{2/3}\to\infty$, $(8)^{2/3}\to 4$)

Don't forget to write on Exam!!

7.7 continued

Important integrals:

① $a>0$ $\int_a^\infty \frac{1}{x^p}\,dx$ DVS if $p\le 1$, eg. $\int_2^\infty \frac{1}{x^{1/2}}\,dx$, $\int_3^\infty \frac{1}{x^{1/3}}\,dx$, $\int_1^\infty \frac{1}{x}\,dx$

vs.

CVS if $p>1$, eg, $\int_3^\infty \frac{1}{x^3}\,dx$, $\int_5^\infty \frac{1}{x^5}\,dx$

② $a>0$ $\int_0^a \frac{1}{x^p}\,dx$ DVS if $p\ge 1$, eg. $\int_0^1 \frac{1}{x^3}\,dx$, $\int_0^5 \frac{1}{x^{1/2}}\,dx$, $\int_0^1 \frac{1}{x}\,dx$

vs.

CVS if $p<1$, eg. $\int_0^1 \frac{1}{\sqrt{x}}\,dx$, $\int_0^5 \frac{1}{x^{1/3}}\,dx$