If f is continuous on $[a,b)$ but not at b then $\int_a^b f(x)\,dx = \lim_{t\to b^-} \int_a^t f(x)\,dx$ (if limit exists).

If f is continuous on $(a,b]$ but not at a then $\int_a^b f(x)\,dx = \lim_{t\to a^+} \int_t^b f(x)\,dx$ (if limit exists).

If the limit exists, the integral is <u>convergent</u>. Otherwise it is <u>divergent</u>.

<u>Comparison Test</u>: If f and g are continuous functions with $f(x) \geq g(x) \geq 0$ for $x \geq a$,

1. If $\int_a^\infty f(x)\,dx$ is convergent then $\int_a^\infty g(x)\,dx$ is convergent
2. If $\int_a^\infty g(x)\,dx$ is divergent then $\int_a^\infty f(x)\,dx$ is divergent

because $\int_a^t f(x)\,dx \geq \int_a^t g(x)\,dx$ for all $t \geq a$

Look at problems 5, 15, 25, 31, 49