Sec 11.1 page 736 # 53:

$$\lim_{n\to\infty} \underbrace{\left(1+\frac{2}{n}\right)^n}_{a_n}$$

Let $b_n = \ln(a_n) = n\ln\left(1+\frac{2}{n}\right) = \dfrac{\ln\left(1+\frac{2}{n}\right)}{\left(\frac{1}{n}\right)}$,

Then $b_n = \dfrac{f(x)}{g(x)}$, where $f(x) = \ln\left(1+\frac{2}{x}\right)$, $g(x)=\frac{1}{x}$.

$\lim_{x\to\infty} \ln\left(1+\frac{2}{x}\right) = \ln(1) = 0$.

$\lim_{x\to\infty} \frac{1}{x} = 0$. Thus, L'Hospital's Rule

yields: $\lim_{x\to\infty} f(x)/g(x) = \lim_{x\to\infty} \dfrac{f'(x)}{g'(x)} =$

$$= \lim_{x\to\infty} \frac{\frac{1}{\left(1+\frac{2}{x}\right)}\cdot\left(\frac{-2}{x^2}\right)}{-\frac{1}{x^2}} = \lim_{x\to\infty} \frac{2}{\left(1+\frac{2}{x}\right)} = 2.$$

Thus

$$\lim_{n\to\infty} a_n = \lim_{n\to\infty} e^{b_n} = e^{\lim_{n\to\infty} b_n} = \boxed{e^2}.$$

Sec 11.1 Theorem 4 +
e^x is continuous at $x=2$.