

Exercise 12

(a) Use a graph of

$$f(x) = \left(1 - \frac{2}{x}\right)^x$$

to estimate the value of $\lim_{x \rightarrow \infty} f(x)$ correct to two decimal places.

(b) Use a table of values of $f(x)$ to estimate the limit to four decimal places.

Solution

Evaluate the function at the given values of x .

| x | $f(x)$ |
|-------|-----------|
| 0 | undefined |
| 1 | -1 |
| 2 | 0 |
| 3 | 0.037037 |
| 4 | 0.0625 |
| 5 | 0.07776 |
| 6 | 0.0877915 |
| 7 | 0.0948645 |
| 8 | 0.100113 |
| 9 | 0.10416 |
| 10 | 0.107374 |
| 20 | 0.121577 |
| 50 | 0.129886 |
| 100 | 0.13262 |
| 10000 | 0.135308 |

$$\lim_{x \rightarrow \infty} \left(1 - \frac{2}{x}\right)^x = \frac{1}{e^2} \approx 0.1353$$

