Solution (#1464) Stirling's approximation is always an underestimate of the factorial. We see with a computer that

$$\text{(i)} \quad \frac{\sqrt{2\pi n}\,(n/e)^n}{n!} \geqslant 0.9 \qquad \text{for } n \geqslant 1;$$

$$\text{(ii)} \quad \frac{\sqrt{2\pi n}\,(n/e)^n}{n!} \geqslant 0.99 \qquad \text{for } n \geqslant 9;$$

$$\text{(iii)} \quad \frac{\sqrt{2\pi n}\,(n/e)^n}{n!} \geqslant 0.999 \qquad \text{for } n \geqslant 84;$$

$$\text{(iv)} \quad \frac{\sqrt{2\pi n}\,(n/e)^n}{n!} \geqslant 0.9999 \qquad \text{for } n \geqslant 834;$$