Math 1A: True/False quick quiz

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Decide whether each of the following statements is TRUE or FALSE. These exercises are from the Chapter 7 review in *Single Variable Calculus: Early Transcendentals for UC Berkeley* by James Stewart.

1. $\dfrac{x(x^2+4)}{x^2-4}$ can be put in the form $\dfrac{A}{x+2}+\dfrac{B}{x-2}$.
2. $\dfrac{x^2+4}{x(x^2-4)}$ can be put in the form $\dfrac{A}{x}+\dfrac{B}{x+2}+\dfrac{C}{x-2}$.
3. $\dfrac{x^2+4}{x^2(x-4)}$ can be put in the form $\dfrac{A}{x^2}+\dfrac{B}{x-4}$.
4. $\dfrac{x^2-4}{x(x^2+4)}$ can be put in the form $\dfrac{A}{x}+\dfrac{B}{x^2+4}$.
5. $\displaystyle\int_0^4 \frac{x}{x^2-1}\,dx = \frac{1}{2}\ln 15$
6. $\displaystyle\int_1^\infty \frac{1}{x^{\sqrt{2}}}\,dx$ is convergent.
7. If f is continuous, then $\int_{-\infty}^{\infty} f(x)\,dx = \lim_{t\to\infty}\int_{-t}^{t} f(x)\,dx$.
8. The Midpoint Rule is always more accurate than the Trapezoid Rule.
9. Every elementary function has an elementary integral.
10. Every elementary function has an elementary derivative.
11. If f is continuous on $[0,\infty)$ and $\int_1^\infty f(x)\,dx$ is convergent, then $\int_0^\infty f(x)\,dx$ is convergent.
12. If f is a continuous decreasing function on $[1,\infty)$ and $\lim_{x\to\infty} f(x) = 0$, then $\int_1^\infty f(x)\,dx$ is convergent.
13. If $\int_a^\infty f(x)\,dx$ and $\int_a^\infty g(x)\,dx$ are both convergent, then $\int_a^\infty [f(x)+g(x)]\,dx$ is convergent.
14. If $\int_a^\infty f(x)\,dx$ and $\int_a^\infty g(x)\,dx$ are both divergent, then $\int_a^\infty [f(x)+g(x)]\,dx$ is divergent.
15. If $0 \le f(x) \le g(x)$ and $\int_0^\infty g(x)\,dx$ diverges, then $\int_0^\infty f(x)\,dx$ diverges.