Derivatives of Logarithmic Functions P-Set

Find the derivative of each.

1. $f(x) = 5\ln(x)$
2. $f(x) = \ln(x^6)$
3. $f(x) = 10 - 12\ln(x)$
4. $y = 4x^3 \cdot \ln(x)$

A research assistant in biology finds in an experiment that at low temperatures the growth of a certain bacteria culture can be modeled by

$$f(t) = 750 + 12\ln(t) \quad t \geq 1$$

where t represents the number of hours since the start of the experiment and $f(t)$ represents the number of bacteria present.

5. Evaluate and interpret $f(12)$
6. Determine $f'(t)$
7. Evaluate and interpret $f'(12)$

Find the derivative of each.

8. $f(x) = \ln(x + 7)$
9. $f(x) = \ln(x^2 + 3)$
10. $f(x) = \ln\left(\sqrt{2x + 5}\right)$
11. $f(x) = \sqrt{x} \cdot \ln\left(\sqrt{x}\right)$

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Key

1. $\frac{5}{x}$
2. $\frac{6}{x}$
3. $-\frac{12}{x}$
4. $12x^2 \cdot \ln(x) + 4x^2$
5. $f(12) \approx 780$; 12 hours after the start, there are approximately 780 bacteria.
6. $\frac{12}{t}$
7. $f'(12) = 1$; 12 hours after the start, the bacteria are growing by 1 bacteria per hour.
8. $\frac{1}{x+7}$
9. $\frac{2x}{x^2+3}$
10. $\frac{1}{2x+5}$
11. $\frac{1}{2\sqrt{x}}\ln(\sqrt{x}) + \frac{1}{2\sqrt{x}}$