Derivatives of Products and Quotients P-Set

Use the Product Rule to determine the derivative of each.

1. $f(x) = x^2(2x+1)$
2. $f(x) = (2x-1)(x^2-2x-3)$
3. $y = (3x^2-2x+1)(2x^2+5x-7)$
4. $y = (2\sqrt{x}+4x-3)(3x-4)$
5. $g(x) = (2x^{4/3}+3x)(-2x^{7/3}+2)$
6. $g(x) = (x^{2/3}+x+1)(x^{-1}+x^{-2})$

The monthly sales of a new computer are given by $q(t) = 30t - 0.5t^2$, where t is in months and $q(t)$ is in hundred units per month after the computer hits the market.

7. Determine the revenue function $R(t)$. Do not simplify.
8. Compute and interpret $R'(6)$.

Use the Quotient Rule to determine the derivative of each.

9. $f(x) = \frac{3x-4}{x-1}$
10. $y = \frac{3x^2-5x+1}{5x^2+3x+2}$
11. $g(x) = \frac{4\sqrt{x}+3}{2x+7}$

A local game commission decides to stock a lake with bass. To do this, 100 bass are introduced into the lake. The population of the bass is approximated by

$$P(t) = \frac{100+70t}{1+0.02t} \quad t \geq 0$$

where t is time in months.

12. Compute and interpret $P(5)$.
13. Compute and interpret $P'(5)$.

Key

1. $6x^2+2x$
2. $6x^2-10x-4$
3. $24x^3+33x^2-58x+19$
4. $(x^{-1/2}+4)(3x-4)+3(2\sqrt{x}+4x-3)$
5. $\left(\frac{8}{3}x+3\right)\left(-2x^{7/3}+2\right) - \frac{14}{3}x^{4/3}\left(2x^{4/3}+3x\right)$
6. $\left(\frac{2}{3}x^{-1/3}+1\right)\left(x^{-1}+x^{-2}\right) + \left(-x^{-2}-2x^{-3}\right)\left(x^{2/3}+x+1\right)$
7. $R(t) = t(30t-0.5t^2)$
8. $R'(6) = 306$; after 6 months, the revenue is changing by 306 hundreds of units per month.
9. $\frac{1}{(x-1)^2}$
10. $\frac{34x^2+2x-13}{(5x^2+3x+2)^2}$
11. $\frac{2x^{-1/2}(2x+7)-2(4\sqrt{x}+3)}{(2x+7)^2}$
12. $P(5) \approx 409.1$; after 5 months, the bass population is about 409.
13. $P'(5) \approx 56.2$; after 5 months, the rate of change in the bass population is about 56 bass/month.