Evaluate the derivative of the following functions. Write your result as a single rational expression.

1. $f(x) = x \cos\left(\dfrac{x^2}{3}\right)$

2. $h(t) = \dfrac{1}{t} - \ln|t| + \sqrt{t}$

3. $g(x) = \ln\left(\dfrac{x^2}{\sqrt[3]{5-x}}\right)$

4. $h(z) = e^{-z^4/2}$

5. $f(x) = \dfrac{\sqrt{x}}{\sqrt{x}-1}$

6. $f(x) = (\ln x)(5 - x^2)^3$

7. $g(t) = t^2 e^{-t}$

8. $r(s) = \dfrac{\cot s - 5s}{\csc s}$

9. $f(x) = 4x^{-\frac{1}{2}} + x^{-1} - 2x^{-2}$

10. $y = \ln \dfrac{1+x}{x}$

11. $g(x) = \dfrac{x(1-x)}{(2-x)}$

12. $f(x) = \dfrac{x}{2e^{3x} - e^{2x}}$

13. $f(x) = \arcsin x - \arccos x$

14. $y = x^2 \sqrt{x^2 - 5}$

15. $y = \sqrt{e^{2x} + e^{-2x}}$

16. $y = \arctan 4x - \ln\left(1 + 16x^2\right)$

17. $h(x) = \dfrac{\sin 2x}{e^{x^2}}$

18. $g(x) = \ln(\ln x)^3$

Evaluate the following derivatives with respect to x.

19. $5x^2 y - xy + y = 9$

20. $\dfrac{6y^3 - x}{xy^2} = 5x$

21. $2x^2 - 10y^2 = 11$

22. $\dfrac{(x-2)^2}{4} + \dfrac{(y+1)^2}{6} = 1$

23. $y \arcsin 2x = 5$