

## Math Xb—Spring 2004

### Problems on the Chain Rule

Note that  $\log x = \log_{10} x$  and  $\exp(x) = e^x$ .

1. Find the derivative of  $f(x) = (x^2 - 5x + 7)^{17}$ .
2. Find the derivative of  $g(x) = \exp(\sin^2 x)$ .
3. Find the derivative of  $h(x) = \ln(x^2 - \tan x)$ .
4. Find the derivative of  $y = 3^{2x+\ln x}$ .
5. Find the derivative of  $f(x) = \cot(e^x + x^2)$ .
6. Find the derivative of  $y = \tan^{-1}(t^2 + 2t - 5)$ .
7. Find the derivative of  $f(x) = \ln(\sqrt{x} + e^x)$ .
8. Find the derivative of  $g(x) = \sec(x^2 + 5x - 3)$ .
9. Find the derivative of  $h(x) = \ln\left(\frac{\sqrt{x}}{(1+x^2)^4}\right)$ .
10. Find the derivative of  $f(z) = e^{-z^2}$ .

### Answers

1.  $f'(x) = 17(2x - 5)(x^2 - 5x + 7)^{16}$ .
2.  $g'(x) = 2 \exp(\sin^2 x) \sin x \cos x$ .
3.  $h'(x) = \frac{2x - \sec^2 x}{x^2 - \tan x}$ .
4.  $y' = 3^{2x+\ln x}(\ln 3) \left(2 + \frac{1}{x}\right)$ .
5.  $f'(x) = -(e^x + 2x) \csc^2(e^x + x^2)$ .
6.  $y' = \frac{2t + 2}{1 + (t^2 + 2t - 5)^2}$ .
7.  $f'(x) = \frac{1/(2\sqrt{x}) + e^x}{\sqrt{x} + e^x}$ .
8.  $g'(x) = (2x + 5) \sec(x^2 + 5x - 3) \tan(x^2 + 5x - 3)$ .
9.  $h'(x) = \frac{1}{2x} - \frac{8x}{1 + x^2}$ .
10.  $f'(z) = -2ze^{-z^2}$ .