Differentiate:

1. $\sin x,\ \cos x,\ \tan x$

2. $\csc x,\ \sec x,\ \cot x$

3. $e^x,\ 2^x,\ \ln x,\ \log_2 x$

4. $\sin^{-1} x,\ \cos^{-1} x,\ \tan^{-1} x$

5. $\dfrac{e^{1/x}}{x^2}$

6. $x \ln x - x$

7. $x^2 2^x$

8. $\dfrac{\log_3 x}{x^3 - 3x - 1}$

9. $\sin(3x)\ln(2x+1)$

10. $\arccos(e^{2x})$

11. $\arctan(x - \sqrt{1+x^2})$

12. $x\ln(\arctan x)$

13. $e^{\cos x} + \cos(e^x)$

14. $3^{x \ln x}$

Answers (somewhat unsimplified):

1. $\cos x,\ -\sin x,\ \sec^2 x$
2. $-\csc x \cot x,\ \sec x \tan x,\ -\csc^2 x$
3. $e^x,\ 2^x \ln 2,\ \dfrac{1}{x},\ \dfrac{1}{x \ln 2}$
4. $\dfrac{1}{\sqrt{1-x^2}},\ \dfrac{-1}{\sqrt{1-x^2}},\ \dfrac{1}{1+x^2}$
5. $\dfrac{-e^{1/x}(2x+1)}{x^4}$
6. $\ln x$
7. $x^2 2^x \ln 2 + x 2^{x+1}$
8. $\dfrac{(x^3-3x-1)\left(\frac{1}{x \ln 3}\right) - (\log_3 x)(3x^2-3)}{(x^3-3x-1)^2}$
9. $\sin(3x)\dfrac{2}{2x+1} + 3\ln(2x+1)\cos(3x)$
10. $\dfrac{-2e^{2x}}{\sqrt{1-e^{4x}}}$
11. $\dfrac{1-x(1+x^2)^{-1/2}}{1+(x-\sqrt{1+x^2})^2}$
12. $x\left(\dfrac{1}{\arctan x}\right)\left(\dfrac{1}{1+x^2}\right) + \ln(\arctan x)$
13. $-e^{\cos x}\sin x - e^x \sin(e^x)$
14. $3^{x \ln x} \ln 3\,(1+\ln x)$