Derivatives Practice

With the techniques we have developed, we can now differentiate almost any functions we encounter by using some combination of known rules. Below is a large collection of derivatives each pulled directly from the old exams archives. For each problem, find $\frac{dy}{dx}$ (a and b are constants where they appear). You need to get to a point where you can do these quickly without error.

1. $y = (\ln(x))^3$
2. $y = x^{\cos(x)}$
3. $y = \tan(e^x)$
4. $\dfrac{d^{16}}{dx^{16}}(3x^{15})$
5. $x^4 + xy + y^4 = 3$
6. $y = 7(x^2 + 3x)$
7. $y = \cos(\tan(2x))$
8. $y = (ax^2 + b)e^{-cx}$
9. $y = \dfrac{3x\ln(x)}{2x^3 - x + 7}$

10. $y = (\sin(x))^{x^2}$

11. $y^3 - x^2y - 2x^3 = 8$

12. $y = 240\ln(x/12) - 20x$

13. $y = \left(\frac{x^2+1}{x^4+2}\right)^{50}$

14. $y = \left(\frac{2}{x}\right)^{1/x}$

15. $y = \cos^2(\sin(x))$

16. $x^3 - y^3 = 2xy$

17. $y = \dfrac{3x^2 + \ln(x)}{\sin(e^x)}$

18. $y = x\tan^{-1}(\sqrt{x})$

22. $y = \cos(e^{-x^2})$

23. $y = x^{\sin(2ax)}$

24. $y = \frac{x}{\sqrt{1-x^2}}$

25. $\sin(x + 2y) = 2x\cos(y)$

26. $y = \dfrac{\cos(x^2)e^{x^2-x}}{\ln(2x-3)}$

27. $y = \tan^{-1}(\ln(x^3 + 5))$

28. $y = \sin\left(\dfrac{e^t}{\cos(t)}\right)$

29. $y = x^{x\sec(x)}$

30. $\frac{x}{y} + x^y = 5$