Week 6 FLO (Friday Learning Opportunity)

1. For each function, find a formula for its *derivative*.
   (a) $U(x) = (2x^2 + \sqrt{2})^{23}$. Although an alternative formula for U is

$$U(x) = 8388608x^{46} + 232\,\tfrac{45}{2}\,x^{44} + 1061158912x^{42} + 17712\,\tfrac{43}{2}\,x^{40} + 18570280960x^{38} + 336492\,\tfrac{41}{2}\,x^{36} + 105850601472x^{34} + 2451572\,\tfrac{39}{2}\,x^{32} + 257065746432x^{30} + 4085952\,\tfrac{39}{2}\,x^{28} + 299910037504x^{26} + 6760392\,\tfrac{37}{2}\,x^{24} + 177219567616x^{22} + 5720332\,\tfrac{35}{2}\,x^{20} + 53555363840x^{18} + 2451572\,\tfrac{33}{2}\,x^{16} + 8033304576x^{14} + 1009472\,\tfrac{29}{2}\,x^{12} + 551305216x^{10} + 88552\,\tfrac{27}{2}\,x^{8} + 14508032x^{6} + 2532\,\tfrac{25}{2}\,x^{4} + 94208x^{2} + 2\,\tfrac{23}{2},$$

   I don't think that's a good approach.)
   (b) $N(x) = \cos(x^2)$
   (c) $K(x) = \cos(x^2)\sin(x^2)$
   (d) $Q(z) = \dfrac{1+\tan(2x)}{1-\tan(2x)}$
   (e) $Z(t) = t\cos(\pi t)$
   (f) $F(x) = \sin(x^2)^2 + \frac{1}{2}\cos(2x^2)$
2. Given that if $y = x^x$, then $\dfrac{\mathrm{d}y}{\mathrm{d}x} = x^x(\ln(x)+1)$, find $\dfrac{\mathrm{d}}{\mathrm{d}x}\left[\cos(x)^{\cos(x)}\right]$
3. Find an equation of the tangent line to the curve $y = \cos(\pi x)$ at the point $(x = 1/3, y = 1/2)$