1. Find the numerical value of each limit:
   (a) $\lim_{x\to 9^{(-)}} \begin{cases} x+1 & x<9 \\ \pi & x\geq 9 \end{cases}$
   (b) $\lim_{x\to 9^{(+)}} \begin{cases} x+1 & x<9 \\ \pi & x\geq 9 \end{cases}$
   (c) $\lim_{x\to 9} \begin{cases} x+1 & x<9 \\ \pi & x\geq 9 \end{cases}$
   (d) $\lim_{x\to 10} \begin{cases} x+1 & x<9 \\ \pi & x\geq 9 \end{cases}$
   (e) $\lim_{x\to -1} \begin{cases} x+1 & x<9 \\ \pi & x\geq 9 \end{cases}$
   (f) $\lim_{x\to 9} \dfrac{\sqrt{x+2}-\sqrt{11}}{x-9}$.
   (g) $\lim_{x\to 9} \dfrac{x^2-81}{x-9}$.
2. Find each derivative
   (a) $\dfrac{\mathrm{d}}{\mathrm{d}x}\left[(x+9)(x^2+11)\right]$
   (b) $\dfrac{\mathrm{d}}{\mathrm{d}x}\left[x(x+1)(x+2)\right]$
   (c) $\dfrac{\mathrm{d}}{\mathrm{d}x}\left[\dfrac{x+9}{x^2+11}\right]$
   (d) $\dfrac{\mathrm{d}}{\mathrm{d}x}\left[\cos(5)x+\sin(32)\right]$
   (e) $\dfrac{\mathrm{d}}{\mathrm{d}x}\left[\sqrt{100x}\right]$
3. Use a limit of a Newton quotient to show that the function $Q(x) = x^3|x| + 8$ is differentiable at zero.
4. Find a TL to $y = x(x-8)$. The point of tangency is $(x = 8, y = 0)$
5. Find the inverse to the function $K(x) = 5x + 1$ and $\mathrm{dom}(K) = [-1, 1]$.
6. Find the natural domain of $K(x) = \frac{x+9}{8-\frac{2}{x}}$.