3. Show that $cov(a+bx, a+bx) = b^2 cov(x,x)$ and in particular $cov(x,x) = s^2$

• ~~$\cdot cov(a+bx, a+bx) = b(cov(a+$~~ $x)$

• Its the same thing as the last question, except instead of one b we get two bS, so look a Q2 for proofs

so we get $b^2 cov(x,x)$

and $cov(x,x) = (x_i - M(x))(x_i - M_x)$ which is $(x_i - M(x))^2$ which equals s^2 which is $1/N \sum_{i=1}^{N} (x_i - M(x))^2$

4. Yes, the median of the transformed variable equals non-decreasing transformation of the median. This is because ~~x'~~ $x > x'$ and $g(x) \geq g(x')$ retains the same properties.

• Range is not preserved because x' and x are different

• IQR is preserved because it is the differences of the transformed, not the total length

5. No, because $g(x)$ and $m(x)$ can mean fundamentally different things