APC 524 - Homework #1

7)

a)

$a_{20} = 1$

$a_{19} = -210$

$a_{18} = 20615$

$a_{17} = -1254850$

$a_{16} = 53327946$

$a_{15} = -1677280820$

$a_{14} = 40171771630$

$a_{13} = -756111184500$

$a_{12} = 11310276995381$

$a_{11} = -135585182899530$

$a_{10} = 1307535010540395$

$a_9 = -10142299865511450$

$a_8 = 63030812099294896$

$a_7 = -31133364316139064 0$

$a_6 = 120664780378033360$

$a_5 = -35999795171476072 00$

$a_4 = 80378118226450517 76$

$a_3 = -128709$

$a_2 =$

$a_1 =$

b)

using the Newton-Raphson method

root = 20.000083722 ... , which is close but not equal to 20.

using np.root()

root = 19.999809 ... , which is also close but not exact

c)

δ	largest root
10^{-8}	$20.04758... + 1.189..i$
10^{-6}	$23.14901... + 2.74...i$
10^{-4}	$28.4002... + 0.51...i$
10^{-2}	$38.478... + 20.834..i$

the estimate for the largest root changes dramatically even with small perturbations

d)