WHAT IS CLAIMED:

1. A method of producing an oligosaccharide composition, said method comprising:

culturing a recombinant prokaryotic host cell that produces an oligosaccharide composition having a terminal mannose residue to express one or more *N*-acetylglucosaminyl transferase enzyme activity (EC 2.4.1.101; EC 2.4.1.143; EC 2.4.1.145; EC 2.4.1.155; EC 2.4.1.201) that catalyzes the transfer of a UDP-GlcNAc residue onto said terminal mannose residue, said culturing step carried out under conditions effective to produce an oligosaccharide composition having a terminal GlcNAc residue, wherein the culturing step further comprises the host cell to express one or more sialyltransferase enzyme activity (EC 2.4.99.4 and EC 2.4.99.1) that catalyzes the transfer of a CMP-NANA residue onto said terminal galactose residue, said culturing step carried out under conditions effective to produce an oligosaccharide composition having a terminal sialic acid residue, wherein the oligosaccharide compositions comprises $NANA_{1-5}Gal_{1-5}GlcNAc_{1-5}Man_3GlcNAc_2$.