2.7

1) $2^{-3} \cdot 2^{-2} = 2^{-3-2} = 2^{-5} = \dfrac{1}{2^5} = \dfrac{1}{32}$

2) $3^{-2} \cdot 5^{-2} = (3 \cdot 5)^{-2} = 15^{-2} = \dfrac{1}{15^2} = \dfrac{1}{225}$

3) $4^{-4} \cdot (-1)^{-4} = \big(4 \cdot (-1)\big)^{-4} = (-4)^{-4} = \dfrac{1}{(-4)^4} = \dfrac{1}{256}$

4) $\left(-\frac{1}{4}\right)^{-3} = \left(\frac{1}{-4}\right)^{-3} = \big((-4)^{-1}\big)^{-3} = (-4)^{(-1)\cdot(-3)} = (-4)^3 = -64$

5) $\dfrac{4^{-3}}{4^{-2}} = 4^{-3-(-2)} = 4^{-1} = \dfrac{1}{4^1} = \dfrac{1}{4}$

6) $\left(\frac{2}{5}\right)^{-5} = \dfrac{2^{-5}}{5^{-5}} = \dfrac{\frac{1}{2^5}}{\frac{1}{5^5}} = \dfrac{\frac{1}{32}}{\frac{1}{3125}} = \dfrac{3125}{32}$

7) $5^{-3} \cdot 5^6 = 5^{-3+6} = 5^3 = 125$

8) $4^3 \cdot 4^{-5} = 4^{3-5} = 4^{-2} = \dfrac{1}{4^2} = \dfrac{1}{16}$

9) $2^{-4} \cdot 2^{-6} = 2^{-4-6} = 2^{-10} = \dfrac{1}{2^{10}} = \dfrac{1}{1024}$

10) $\big((-3)^{-1}\big)^2 = (-3)^{(-1)\cdot 2} = (-3)^{-2} = \dfrac{1}{(-3)^2} = \dfrac{1}{9}$

11) $\dfrac{3^{-2}}{3^4} = 3^{-2-4} = 3^{-6} = \dfrac{1}{3^6} = \dfrac{1}{729}$

12) $\big((-1)^{-2}\big)^{-3} = (-1)^{(-2)\cdot(-3)} = (-1)^6 = 1$

13) $(3^{-4})^2 = 3^{(-4)\cdot 2} = 3^{-8} = \dfrac{1}{3^8} = \dfrac{1}{6561}$

14) $(3^4)^{-2} = 3^{4\cdot(-2)} = 3^{-8} = \dfrac{1}{3^8} = \dfrac{1}{6561}$

15) $(7^{-2})^{-2} = 7^{(-2)\cdot(-2)} = 7^4 = 2401$

16) $\dfrac{9^3}{9^5} = 9^{3-5} = 9^{-2} = \dfrac{1}{9^2} = \dfrac{1}{81}$

17) $\dfrac{6^{-2}}{6} = 6^{-2-1} = 6^{-3} = \dfrac{1}{6^3} = \dfrac{1}{216}$

18) $\dfrac{5^{-3}}{5^{-2}} = 5^{-3-(-2)} = 5^{-1} = \dfrac{1}{5^1} = \dfrac{1}{5}$

19) $10^3 - 10^2 = 1000 - 100 = 900$

20) $10^4 - 10^3 = 10\ 000 - 1000 = 9000$