

U4/L1 HW Text p 221 1, 2, 4-7, 13a, b, c, d, g, 16, 18. d, e, f (18 b, c have errors in answers)

1. a) $5^{-4} = \frac{1}{5^4}$ b) $(-\frac{1}{10})^{-3} = (-10)^3$ c) $\frac{1}{2^{-4}} = 2^4$ d) $-\left(\frac{6}{5}\right)^{-3} = -\left(\frac{5}{6}\right)^3$ e) $\left(\frac{3}{11}\right)^{-1} = \frac{11}{3}$ f) $\frac{7^{-2}}{8^{-1}} = \frac{8}{7^2}$

2. a) $(-10)^8(-10)^{-8} = (-10)^0 = 1$ b) $6^{-7} \times 6^5 = 6^{-2} = \frac{1}{6^2}$ c) $\frac{2^8}{2^{-5}} = 2^{13}$ d) $\frac{11^{-3}}{11^5} = 11^{-8} = \frac{1}{11^8}$ e) $(-9^4)^{-1} = -\frac{1}{9^4}$ f) $(7^{-3})^{-2} = 7^{-12} = \frac{1}{7^{12}}$

4. a) $2^{-3}(2^7) = 2^4 = 16$ b) $(-8)^3(-8)^{-3} = (-8)^0 = 1$ c) $\frac{5^4}{5^6} = 5^{-2} = \frac{1}{5^2} = \frac{1}{25}$ d) $\frac{3^{-8}}{3^{-6}} = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$ e) $(4^{-3})^{-1} = 4^3 = 64$ f) $(7^{-1})^2 = 7^{-2} = \frac{1}{49}$

5. a) $3^3(3^2)^{-1} = 3^3(3^{-2}) = 3^1 \text{ or } 3$ b) $(9 \times 9^{-1})^{-2} = (9^0)^{-2} = 9^0 = 1$ c) $\frac{(12^{-1})^3}{12^{-3}} = \frac{12^{-3}}{12^{-3}} = 12^0 \text{ or } 1$ d) $\frac{(5^3)^{-2}}{5^{-6}} = \frac{5^{-6}}{5^{-6}} = 1$ e) $(3^{-2}(3^3))^{-2} = (3^1)^{-2} = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$ f) $9^7(9^3)^{-2} = 9^7 \cdot 9^{-6} = 9$

6. a) $10(10^4(10^{-2})) = 10(10^2) = 10^3 = 1000$ b) $8(8^2)(8^{-4}) = 8^{-1} = \frac{1}{8}$ c) $\frac{6^{-5}}{(6^2)^{-2}} = \frac{6^{-5}}{6^{-4}} = 6^{-1} = \frac{1}{6}$ d) $\frac{4^{-10}}{(4^{-4})^3} = \frac{4^{-10}}{4^{-12}} = 4^2 = 16$ e) $2^8 \times \left(\frac{2^{-5}}{2^6}\right) = 2^8 \times 2^{-11} = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$ f) $13^{-5} \times \left(\frac{13^2}{13^8}\right)^{-1} = 13^{-5} \times (13^{-6})^{-1} = 13^{-5} \times 13^6 = 13$

$$7. a) 16^{-1} - 2^{-2} = \frac{1}{16} - \frac{1}{4} = \frac{1}{16} - \frac{4}{16} = \frac{-3}{16}$$

$$b) (-3)^{-1} + 4^0 - 6^{-1} = -\frac{1}{3} + 1 - \frac{1}{6} = \frac{-2}{6} + \frac{6}{6} - \frac{1}{6} = \frac{3}{6} \text{ or } \frac{1}{2}$$

$$c) \left(-\frac{2}{3}\right)^{-1} + \left(\frac{2}{5}\right)^{-1} = -\frac{3}{2} + \frac{5}{2} = \frac{2}{2} \text{ or } 1$$

$$d) \left(\frac{1}{5}\right)^{-1} + \left(-\frac{1}{2}\right)^{-2} = 5 + \left(\frac{-2}{1}\right)^2 = 5 + 4 = 9$$

$$e) 5^{-3} + 10^{-3} - 8(1000^{-1}) = \frac{1}{125} + \frac{1}{1000} - \frac{8}{1000} = \frac{8}{1000} + \frac{1}{1000} - \frac{8}{1000} = \frac{1}{1000}$$

$$f) 3^{-2} - 6^{-2} + \frac{3}{2}(-9)^{-1} = \frac{1}{9} - \frac{1}{36} + \frac{3}{2} \left(\frac{-1}{9}\right) = \frac{1}{9} - \frac{1}{36} - \frac{1}{6} = \frac{4}{36} - \frac{1}{36} - \frac{6}{36} = -\frac{3}{36} \text{ or } -\frac{1}{12}$$

$$13. a) 2^3 \times 4^{-2} \div 2^2 = 2^3 \times (2^2)^{-2} \div 2^2 = 2^3 \times 2^{-4} \div 2^2 = 2^{-1} \div 2^2 = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

$$b) (2 \times 3)^{-1} = 6^{-1} = \frac{1}{6}$$

$$c) \left(\frac{3^{-1}}{2^{-1}}\right)^{-2} = \left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

$$d) 4^{-1}(4^2 + 4^0) = 4^{-1}(16 + 1) = 4^{-1}(17) = \frac{1}{4}(17) = \frac{17}{4}$$

$$g) \frac{3^{-2} \times 2^{-3}}{3^{-1} \times 2^{-2}} = 3^{-1} \times 2^{-1} = \frac{1}{3 \times 2} = \frac{1}{6}$$

$$16. a) 16^x = \frac{1}{16} \Rightarrow x = -1$$

$$b) 10^x = 0.01 = \frac{1}{100} \text{ or } 10^{-2} \Rightarrow x = -2$$

$$c) 2^x = 1 = 2^0 \Rightarrow x = 0$$

$$d) 2^n = 0.25 = \frac{1}{4} = \frac{1}{2^2} \Rightarrow n = 2$$

$$e) 25^n = \frac{1}{625} = \frac{1}{25^2} \Rightarrow n = 2$$

$$f) 12^n = \frac{1}{144} = \frac{1}{12^2} \Rightarrow n = 2$$

$$18. d) x^{3(7-r)} \cdot x^r = x^{21-3r} \cdot x^r = x^{21-2r}$$

$$f) [(3x^4)^{6-m}] \left(\frac{1}{x}\right)^m = 3^{6-m} \cdot x^{24-4m} \cdot x^{-m} = 3^{6-m} \cdot x^{24-5m}$$

$$e) (a^{10-p}) \left(\frac{1}{a}\right)^p = a^{10-p} \cdot a^{-p} = a^{10-2p}$$