

Review of Mathematics for Social Scientists

CSSS 505

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Solutions to Homework 2

Due Tuesday, April 23, 2002

1) Simplify the following. Do not use parentheses or negative exponents in the final answer.

a) $(2^5)^2$

Solution(1): $2^{10} = 1,024.$

⊗

b) $(3^4)^3$

Solution(1): $3^{12} = 531,441.$

⊗

c) $(2x)^2(2x^{-1})^3$

Solution(1): $2^2x^22^3x^{-3} = 2^5x^{-1} = 32/x.$

⊗

d) $(x^2yz)^3(xy)^4$

Solution(1): $x^6y^3z^3x^4y^4 = x^{10}y^7z^3.$

⊗

e) $\frac{(2^4)^2}{4^2}$

Solution(1): $2^8 \times (2^2)^{-2} = 2^4 = 16.$

⊗

f) $\frac{3^{-2}}{3^{-4}}$

Solution(1): $(3^{-1})^{-2} \times 3^4 = 3^6 = 729.$

⊗

g) $x^3(x^{-1} - x)$

Solution(1): $x^3 \times x^{-1} - x^3 \times x = x^2 - x^4 = x^2(1 - x^2).$

⊗

h) $\frac{3y}{10x^3} + \frac{2}{15xy}$

Solution(1): $\frac{9y^2+4x^3}{30x^3y}.$

⊗

i) $[(2x)^{-1} + (2y)^{-1}]^{-1}$

Solution(1): $\frac{2xy}{x+y}.$

⊗

j) $\frac{\frac{2}{x} + x^{-1}}{\frac{x^2}{2} + \frac{1}{5x^{-2}}}$

Solution(1): $\frac{3x^{-1}}{(2^{-1} + 5^{-1})x^2} = \frac{30}{7x^3}$.

⊗

k) $\frac{x^{-1}}{(x+x^{-1})^{-1}}$

Solution(1): $x^{-1}(x + x^{-1}) = \frac{1+x^2}{x^2}$.

⊗

2) Evaluate the following expressions.

a) $\sqrt{81}$

Solution(1): $(3^4)^{1/2} = 3^2 = 9$.

⊗

b) $\sqrt[5]{-32}$

Solution(1): $((-1)^5 2^5)^{1/5} = -2$.

⊗

c) $0.16^{-1/2}$

Solution(1): $(2^4 10^{-2})^{-1/2} = 2.5$.

⊗

3) Find m such that the following statements are true.

a) $8\sqrt[3]{2} = 2^m$

Solution(1): $2^3 2^{1/3} = 2^m$ and so $m = 3\frac{1}{3}$.

⊗

b) $\sqrt[3]{\frac{2}{8}} = 2^m$

Solution(1): $(2 \times 2^{-3})^{1/3} = 2^m$ and so $m = -\frac{2}{3}$.

⊗

4) Simplify the following expressions.

a) $(16x^4)^{3/4}$

Solution(1): $(2^4 x^4)^{3/4} = (2x)^3 = 8x^3$.

⊗

b) $(32x^5 y^{-10})^{1/5}$

Solution(1): $(2^5 x^5 y^{-10})^{1/5} = 2xy^{-2}$.

⊗

c) $\sqrt[4]{x^{3/2} \cdot 16x^{1/2}}$

Solution(1): $(x^{3/2} 2^4 x^{1/2})^{1/4} = (x^2 2^4)^{1/4} = 2\sqrt{x}$.

⊗