Math 234 BD4 Quiz 8 (4.1, 4.2) **Name (Last, First):** Solutions

You must show all your work to receive credit.

1.] (2 pts) Evaluate both expressions.

(a.) $\left(3^{2/3}\right)\left(9^{2/3}\right) = (3\cdot 9)^{2/3}$

$= 27^{2/3} = \left(27^{1/3}\right)^2$

$= \left(\sqrt[3]{27}\right)^2$

$= 3^2 = \boxed{9}.$

(b.) $\left(\frac{16}{81}\right)^{1/4}\left(\frac{125}{8}\right)^{-2/3}$

$= \frac{\sqrt[4]{16}}{\sqrt[4]{81}} \cdot \left(\frac{8}{125}\right)^{2/3}$

$= \frac{2}{3} \cdot \frac{8^{2/3}}{125^{2/3}} = \frac{2}{3} \cdot \frac{\left(\sqrt[3]{8}\right)^2}{\left(\sqrt[3]{125}\right)^2} = \frac{2}{3} \cdot \frac{2^2}{5^2}$

$= \boxed{\frac{8}{75}}.$

2.] (2 pts) Evaluate both expressions.

(a.) $e^{4\ln(1) - 2\ln(3)}$

$= e^{4\cdot 0 - \ln 3^2} = e^{-\ln 3^2}$

$= e^{\ln\left[(3^2)^{-1}\right]} = (3^2)^{-1}$

$= \boxed{\frac{1}{9}}.$

(b.) $\log_4\left(2^{16}\right)$

$= \log_4 (2^2)^8 = \log_4 (4^8)$

$= 8\log_4(4) = 8\cdot 1 = 8.$

(or)

$\log_4 2^{16} = 16\log_4 2 = 16\log_4 4^{1/2}$

$= 16\left(\frac{1}{2}\right) = 8.$

3.] (2 pts) Simplify both expressions (answer should have simple arguments).

(a.) $\ln\left(x^2\sqrt{4-x^2}\right)$

$= \ln(x^2) + \ln\left(\sqrt{4-x^2}\right)$

$= 2\ln x + \ln(4-x^2)^{1/2}$

$= 2\ln x + \frac{1}{2}\ln(4-x^2)$

$= 2\ln x + \frac{1}{2}\ln(2-x)(2+x)$

$= 2\ln x + \frac{1}{2}\left[\ln(2-x) + \ln(2+x)\right].$

(b.) $\left(y^{3/7}\right)^{-7/3}$

$= y^{\frac{3}{7}\cdot\left(-\frac{7}{3}\right)}$

$= y^{-1} = \boxed{\frac{1}{y}}.$

4.] (2 pts) Find all real numbers x that satisfy the equation.

$$2^{6-x} = 4^x$$

$$2^{6-x} = (2^2)^x$$

$$2^{6-x} = 2^{2x}$$

$$6 - x = 2x$$

$$6 = 3x$$

$$\underline{2 = x}$$

5.] (2 pts) Solve the equation for x; simplify your answer.

$$3 = 2 + 16e^{-4x}$$

$$1 = 16e^{-4x}$$

$$\frac{1}{16} = e^{-4x}$$

$$\ln\left(\frac{1}{16}\right) = \ln\left(e^{-4x}\right)$$

$$\ln\left(\frac{1}{16}\right) = -4x$$

$$\frac{\ln\left(\frac{1}{16}\right)}{-4} = x$$

$$= -\frac{1}{4}\ln\left(\frac{1}{16}\right)$$

$$= \ln\left[\left(\frac{1}{16}\right)^{-1/4}\right] = \ln\left[16^{1/4}\right] = \underline{\ln 2}.$$