

5.5.13, 17, 25

Exercises 5.5.13, 5.4.17, and 5.4.25

Use properties of logarithms to find the exact value of each expression.  $\log_4(6) - \log_4(5)$

(13)  $\log_7(7^{29})$ . (17)  $9^{\log_9(13)}$ . (25) 4

Solution

(13) By Theorem 5.5.A(2),  $\log_a(a^r) = r$ , so

$$\boxed{\log_7(7^{29}) = 29} \quad (\text{we take } a=7 \text{ and } r=29).$$

(17) By Theorem 5.5.A(1),  $a^{\log_a(M)} = M$ , so

$$\boxed{9^{\log_9(13)} = 13} \quad (\text{we take } a=9 \text{ and } M=13).$$

(25) By Theorem 5.5.A(4),  $\log_a(M/N) = \log_a(M) - \log_a(N)$   
so  $\log_4(6) - \log_4(5) = \log_4(6/5)$  (we take  
 $a=4$ ,  $M=6$ , and  $N=5$ ). So by Theorem 5.5.A(1),

$$4^{\log_4(6) - \log_4(5)} = 4^{\log_4(6/5)} = \boxed{6/5}.$$

□