Practice Quiz 3, M203E

Instructions: The quiz is open book (any books) and open notes (any notes or written material). Each problem is worth 10 points.

[1] (a) What is the remainder if you divide 63791 by 9? Show your work or explain how you get your answer.

(b) What is the remainder if you divide 73214419 by 5? Show your work or explain how you get your answer.

[2] (a) What is the remainder if you divide 3^{16000} by 17? Show your work or explain how you get your answer.

(b) What is the remainder if you divide 2^{1203} by 13? Show your work or explain how you get your answer.

[3] In the cipher using the formula $y = x^{11} \bmod 17$, the encryption exponent is $e = 11$.
Find the decryption exponent d (thus the decryption formula is $x = y^d \bmod 17$.)
Explain how you get your answer.

[4] In the cipher using the formula $y = x^7 \bmod 21$, the encryption exponent is $e = 7$.
Find the decryption exponent d (thus the decryption formula is $x = y^d \bmod 21$.)
Explain how you get your answer.

[5] It turns out that $2^{90} = 64 \bmod 91$. Explain why this immediately tells you that 91 is not a prime number.
Verify the fact that 91 is not a prime number by finding a factor other than 1 and 91.