Course ID: MATH101 Course Name: Advanced Algebra Test Name: Problem-Solving and Proofs Student ID: 20240001 Student Name: John Doe

To determine aaa, bbb, and ccc, we substitute the given points into the quadratic equation:

1. f(1)=4⇒a(1)2+b(1)+c=4f(1) = 4 \Rightarrow a(1)^2 + b(1) + c = 4f(1)=4⇒a(1)2+b(1)+c=4
a+b+c=4a + b + c = 4a+b+c=4

2. f(2)=7⇒a(2)2+b(2)+c=7f(2) = 7 \Rightarrow a(2)^2 + b(2) + c = 7f(2)=7⇒a(2)2+b(2)+c=7
4a+2b+c=74a + 2b + c = 74a+2b+c=7

3. f(3)=12⇒a(3)2+b(3)+c=12f(3) = 12 \Rightarrow a(3)^2 + b(3) + c = 12f(3)=12⇒a(3)2+b(3)+c=12
9a+3b+c=129a + 3b + c = 129a+3b+c=12

We now solve this system of equations:

• Subtracting the first equation from the second:
(4a+2b+c)−(a+b+c)=7−4(4a + 2b + c) − (a + b + c) = 7 − 4(4a+2b+c)−(a+b+c)=7−4 3a+b=33a + b = 33a+b=3

• Subtracting the second equation from the third:
(9a+3b+c)−(4a+2b+c)=12−7(9a + 3b + c) − (4a + 2b + c) = 12 − 7(9a+3b+c)−(4a+2b+c)=12−7 5a+b=55a + b = 55a+b=5

• Subtracting the two new equations:
(5a+b)−(3a+b)=5−3(5a + b) − (3a + b) = 5 − 3(5a+b)−(3a+b)=5−3
2a=2⇒a=12a = 2 \Rightarrow a = 12a=2⇒a=1

Substituting a=1a = 1a=1 into 3a+b=33a + b = 33a+b=3:
3(1)+b=33(1) + b = 33(1)+b=3 b=0b = 0b=0
Substituting a=1a = 1a=1 and b=0b = 0b=0 into a+b+c=4a + b + c = 4a+b+c=4:
1+0+c=41 + 0 + c = 41+0+c=4 c=3c = 3c=3

Thus, the function is:
f(x)=x2+3f(x) = x^2 + 3f(x)=x2+3