Find the general solution and the specific solution to each of the following differential equations. Show your work neatly organized.

1. $f'(x) = 3x^2 + 6x - 2$; $f(0) = -1$

2. $f'(x) = 6x^2 - 2x + 3$; $f(1) = 2$

3. $f'(x) = x^2 - 2x + 5$; $f(3) = 1$

4. $f'(x) = 3x^2 - 5x - 5$; $f(4) = 4$

5. $f'(x) = (x - 1)^2$; $f(3) = 2$

6. $f'(x) = x^2 + x^{-2}$; $f(2) = 3$

7. $f'(x) = 2x^2 + 8x + 2$; $f(-6) = 1$

Find the general solution and the specific solution to each of the following differential equations. Show your work neatly organized.

8. $f''(x) = 6x + 2$; $f(0) = 4$; $f(1) = 7$ 9. $f''(x) = 12x - 6$; $f(1) = -3$; $f(2) = -3$

10. $f''(x) = 18x + 4$; $f(-1) = 3$; $f(1) = -1$ 11. $f''(x) = 3x - 2$; $f(2) = 3$; $f(-2) = -1$

Write a differential equation and use it to answer the following questions. Show your work neatly organized.

12. **The slope, m, of a particular curve at any point (x,y) on the curve is given by the equation $m = x^2 - 4$. Find the equation of the curve if it passes through the point (3,-1).**

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Write a differential equation and use it to answer the following questions. Show your work neatly organized.

13. The slope, m, of a particular curve at any point (x,y) on the curve is given by the equation m = -2x + 1. Find the equation of the curve if it has a y-intercept of 10.

14. The slope, m, of a particular curve at any point (x,y) on the curve is given by the equation m = x + 2. Find the equation of the curve if it is tangent to the x-axis.

15. A function is such that its second derivative is F''(x) = 6x. Find its equation if it is tangent to y = 2x + 3 at the point (-1,1).