More problems for section 2.9 of Essentials of Precalculus with Calculus Previews by Zill and Dewar, 5e.

1. Find the derivative \( f'(x) \) of each function \( f(x) \) below. Then use your answer to find the slope of the line tangent to the curve \( y = f(x) \) at \( x = a \). Finally, find the equation of that tangent line.

   a. \( f(x) = 14 + 2x, \ a = -1 \)  
   b. \( f(x) = 5x + 2, \ a = 3 \)  
   c. \( f(x) = 2 - 3x, \ a = 0 \)  

   d. \( f(x) = 4x^2 - 5x + 6, \ a = 0 \)  
   e. \( f(x) = 2 + 3x - x^2, \ a = 1 \)  
   f. \( f(x) = 11, \ a = 4 \)  

   g. \( f(x) = x^3 + 3x, \ a = -2 \)  
   h. \( f(x) = 2x^3 - 4x + 1, \ a = 3 \)  
   i. \( f(x) = x^4 - x^2, \ a = -1 \)  

   j. \( f(x) = \frac{1}{x + 2}, \ a = 1 \)  
   k. \( f(x) = \frac{1}{2x + 3}, \ a = 0 \)  
   l. \( f(x) = \frac{2}{3 - x}, \ a = 4 \)  

   m. \( f(x) = \frac{4 - x}{3x}, \ a = 2 \)  
   n. \( f(x) = (x + 1)^3 - 2, \ a = 1 \)  
   o. \( f(x) = (x + 2)^2 - x^2, \ a = 3 \)  

   p. \( f(x) = 2 - (1 - x)^3, \ a = -1 \)  
   q. \( f(x) = \frac{x + 3}{x - 7}, \ a = -2 \)  
   r. \( f(x) = \frac{4}{3x - 1}, \ a = 0 \)  

   s. \( f(x) = \frac{2x}{x^2 + 3}, \ a = 2 \)  
   t. \( f(x) = \sqrt{2x + 1}, \ a = 4 \)  
   u. \( f(x) = 4 - \sqrt{2 + x}, \ a = 2 \)  

   v. \( f(x) = 2 + \sqrt{3x + 4}, \ a = -1 \)  
   w. \( f(x) = \sqrt{1 - 2x}, \ a = -2 \)  
   x. \( f(x) = -\sqrt{3} - x, \ a = -22 \)  

**Answers**

1a. \( f'(x) = 2, \ f'(-1) = 2, \ TL \) is \( y - 12 = 2(x + 1) \) \( (TL \) is the same as the graph of \( f(x) \).)  
1b. \( f'(x) = 5, \ f'(3) = 5, \ TL \) is \( y - 17 = 5(x - 3) \) \( (TL \) is the same as the graph of \( f(x) \).)  
1c. \( f'(x) = -3, \ f'(0) = -3, \ TL \) is \( y - 2 = -3x \) \( (TL \) is the same as the graph of \( f(x) \).)  
1d. \( f'(x) = 8x - 5, \ f'(0) = -5, \ TL \) is \( y - 6 = -5x \).  
1e. \( f'(x) = -3 - 2x, \ f'(1) = -5, \ TL \) is \( y - 4 = -5(x - 1) \).  
1f. \( f'(x) = 0, \ f'(4) = 0, \ TL \) is \( y = 11 \) \( (TL \) is the same as the graph of \( f(x) \).)  
1g. \( f'(x) = 3x^2 + 3, \ f'(-2) = 15, \ TL \) is \( y + 14 = 15(x + 2) \).  
1h. \( f'(x) = 6x^2 - 4, \ f'(3) = 50, \ TL \) is \( y - 43 = 50(x - 3) \).  
1i. \( f'(x) = 4x^3 - 2x, \ f'(-1) = -2, \ TL \) is \( y - 16 = -2(x + 1) \).  
1j. \( f'(x) = \frac{1}{x^2 + 2}, \ f'(1) = \frac{1}{3}, \ TL \) is \( y - \frac{1}{3} = \frac{1}{3}(x - 1) \).  
1k. \( f'(x) = \frac{1}{x^2 - 1}, \ f'(0) = \frac{1}{2}, \ TL \) is \( y - \frac{1}{2} = \frac{1}{2}(x - 1) \).  
1l. \( f'(x) = \frac{1}{x^2 - 4}, \ f'(2) = \frac{1}{12}, \ TL \) is \( y - \frac{1}{12} = \frac{1}{12}(x - 2) \).  
1m. \( f'(x) = 3 + 6x + 3x^2, \ f'(1) = 12, \ TL \) is \( y - 6 = 12(x - 1) \).  
1n. \( f'(x) = 4, \ f'(3) = 4, \ TL \) is \( y - 16 = 4(x - 3) \).  
1o. \( f'(x) = 3 - 6x + 3x^2, \ f'(-1) = 12, \ TL \) is \( y + 6 = 12(x + 1) \).  
1p. \( f'(x) = \frac{x}{x^2 + 2}, \ f'(0) = -12, \ TL \) is \( y + 4 = -12x \).  
1q. \( f'(x) = \frac{1}{x^2 + 4}, \ f'(-2) = \frac{1}{16}, \ TL \) is \( y + \frac{1}{8} = \frac{1}{8}(x + 2) \).  
1r. \( f'(x) = \frac{x}{(x^2 + 1)^2}, \ f'(0) = -12, \ TL \) is \( y + 4 = -12x \).  
1s. \( f'(x) = \frac{1}{(x + 5)^2}, \ f'(2) = \frac{1}{16}, \ TL \) is \( y - \frac{1}{16} = \frac{1}{16}(x - 2) \).  
1t. \( f'(x) = \frac{x}{x^2 + 1}, \ f'(4) = \frac{1}{5}, \ TL \) is \( y - 3 = \frac{1}{5}(x - 1) \).  
1u. \( f'(x) = \frac{1}{x^2 + 2}, \ f'(2) = \frac{1}{6}, \ TL \) is \( y - 2 = \frac{1}{6}(x - 2) \).  
1v. \( f'(x) = \frac{x}{x^2 + 1}, \ f'(-1) = \frac{1}{2}, \ TL \) is \( y - 3 = \frac{1}{2}(x + 1) \).  
1w. \( f'(x) = \frac{1}{x^2 + 2}, \ f'(-2) = \frac{2}{9}, \ TL \) is \( y - \sqrt{5} = \frac{2}{9}(x + 2) \).  
1x. \( f'(x) = \frac{1}{x^2 + 2}, \ f'(-22) = \frac{1}{29}, \ TL \) is \( y + 5 = \frac{1}{29}(x + 22) \).