Name_____

Find $f'(a)$ for the given value of a.

1) $f(x) = \frac{7}{x} - \sqrt{x+5}$ $\quad a = 4$

For the given function, find the points on the graph at which the tangent line has slope 1.

2) $y = \frac{1}{3}x^3 - 2x^2 + 4x + 1$

Find the derivative.

3) $y = \frac{x^2 + 8x + 3}{\sqrt{x}}$

4) $y = 5x^2e^x$

5) $y = \sqrt{x}(5x - 5) + 25x - 25$

Write an equation of the tangent line to the graph of $y = f(x)$ at the point on the graph where x has the indicated value.

6) $f(x) = \frac{-4x^2 - 4}{4x - 1}$ $\quad x = 0$

Differentiate.

7) $y = \left(\frac{5}{x} + x\right)\left(\frac{5}{x} - x\right)$

8) $f(x) = (6\sqrt{x} - 2)(5\sqrt{x} + 7)$

9) $y = \frac{x^2 - 3x + 2}{x^7 - 2}$

10) $f(x) = \frac{\frac{7}{x} + 1}{\frac{3}{x^2} - 1}$

MA181 Professor Katiraie Summer 2007 Quiz 4 Form A

Name Solution

Find f′(a) for the given value of a.

1) $f(x) = \frac{7}{x} - \sqrt{x+5}$ $a = 4$

$f(x) = 7x^{-1} - (x+5)^{1/2}$

$f'(x) = -7x^{-2} - \frac{1}{2}(x+5)^{-\frac{1}{2}}$

$f'(4) = \frac{-7}{4^2} - \frac{1}{2}(4+5)^{-\frac{1}{2}} = \boxed{\frac{-29}{48}}$

For the given function, find the points on the graph at which the tangent line has slope 1.

2) $y = \frac{1}{3}x^3 - 2x^2 + 4x + 1$

$y' = 3.\frac{1}{3}x^2 - 4x + 4$

$y' = x^2 - 4x + 4 = 1$

$x^2 - 4x + 3 = 0$

$(x-3)(x-1) = 0$

$x = 3$, $y = 4$; $x = 1$, $y = 3\frac{1}{3}$

Find the derivative.

3) $y = \frac{x^2 + 8x + 3}{\sqrt{x}} \Rightarrow y = x^{\frac{3}{2}} + 8x^{\frac{1}{2}} + 3x^{-\frac{1}{2}}$

$y' = \frac{3}{2}x^{\frac{1}{2}} + 4x^{-\frac{1}{2}} - \frac{3}{2}x^{-\frac{3}{2}} = \frac{3}{2}x^{\frac{1}{2}} + \frac{4}{x^{1/2}} - \frac{3}{2x^{3/2}}$

4) $y = 5x^2e^x$ $y' = 10xe^x + 5x^2e^x$

5) $y = \sqrt{x}(5x - 5) + 25x - 25 = 5x^{\frac{3}{2}} - 5x^{\frac{1}{2}} + 25x - 25$

$y' = \frac{15}{2}x^{\frac{1}{2}} - \frac{5}{2}x^{-\frac{1}{2}} + 25$

$= \frac{15}{2}\sqrt{x} - \frac{5}{2\sqrt{x}} + 25$

Write an equation of the tangent line to the graph of y = f(x) at the point on the graph where x has the indicated value.

6) $f(x) = \frac{-4x^2 - 4}{4x - 1}$ $x = 0$, $y = \frac{-4}{-1} = 4$

$f'(x) = \frac{-8x(4x-1) - 4(-4x^2-4)}{(4x-1)^2}$

$f'(0) = \frac{16}{1} = 16$

$y - y_1 = m(x - x_1)$

$y - 4 = 16(x - 0)$

$y = 16x + 4$

erentiate.

7) $y = \left(\frac{5}{x} + x\right)\left(\frac{5}{x} - x\right) = \frac{25}{x^2} - x^2 = 25x^{-2} - x^2$

$y' = -50x^{-3} - 2x = \boxed{\frac{-50}{x^3} - 2x}$

8) $f(x) = (6\sqrt{x} - 2)(5\sqrt{x} + 7) = 30x + 42\sqrt{x} - 10\sqrt{x} - 14$

$= 30x - 32\sqrt{x} - 14$

$f'(x) = 30 - 32 \cdot \frac{1}{2}x^{-\frac{1}{2}} - 0 = 30 - 16x^{-\frac{1}{2}}$

$= \boxed{30 - \frac{16}{\sqrt{x}}}$

9) $y = \frac{x^2 - 3x + 2}{x^7 - 2}$

$y' = \boxed{\frac{(2x-3)(x^7-2) - 7x^6(x^2-3x+2)}{(x^7-2)^2}}$

10) $f(x) = \frac{\frac{7}{x} + 1}{\frac{3}{x^2} - 1} = \frac{\frac{7+x}{x}}{\frac{3-x^2}{x^2}} = \frac{(7+x)}{x} \cdot \frac{x^2}{3-x^2} = \frac{7x + x^2}{3 - x^2}$

$f'(x) = \frac{(7+2x)(3-x^2) - -2x(7x+x^2)}{(3-x^2)^2}$

$= \boxed{\frac{(7+2x)(3-x^2) + 2x(7x+x^2)}{(3-x^2)^2}}$