WARM UP

Try another one... find the equation of the tangent and normal lines for when $f(x)=\sqrt{x}$ and $x=3$

slope

$f(x)=\sqrt{x}$

$f(x)=x^{\frac{1}{2}}$

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

$f'(3)=\frac{1}{2}(3)^{-\frac{1}{2}}$

$f'(3)=\frac{1}{2}\frac{1}{\sqrt{3}}$

$m=\frac{1}{2\sqrt{3}}$

point

$x=3$

$f(3)=\sqrt{3}$

$(3,\sqrt{3})$

tangent: $y-\sqrt{3}=\frac{1}{2\sqrt{3}}(x-3)$

normal line: $y-\sqrt{3}=-2\sqrt{3}(x-3)$

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Chain Rule

Chain rule is used when a function is really a composition of two functions.

if $y=f(g(x))$ then

$y'=f'(g(x))\,g'(x)$

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Chain Rule

For Example:

$y = (x^2+7x)^4$

then $y' = 4(x^2+7x)^3\,(2x+7)$

$= (8x+28)(x^2+7x)^3$

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Sometimes you will see the rule written like this:

if $y = u(v(x))$ then

$y' = u'(v(x))\,v'(x)$

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$f(x) = (3X-1)^8$

$f'(x) = 8(3x-1)^7(3)$

$f'(x) = 24(3x-1)^7$

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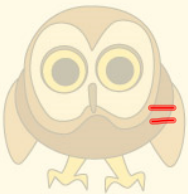
$f(x) = \dfrac{1}{\sqrt{X^2-5X}}$

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

$f'(x) = -\frac{1}{2}(x^2-5x)^{-3/2}(2x-5)$



$= -\dfrac{(2x-5)}{2}(x^2-5x)^{-3/2}$

$= \dfrac{5-2x}{2}(x^2-5x)^{-3/2}$

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Homework: p 217 #s 1-10 all

Exercise 7K

Each function is in the form $f(x) = u(v(x))$.
Identify $u(x)$ and $v(x)$, then find the derivative of f.

1 $f(x) = (3x^4 + 2x)^5$

2 $f(x) = 4(2x^2 + 3x + 1)^3$

3 $f(x) = \ln(3x^5)$

4 $f(x) = \sqrt[3]{2x + 3}$

5 $f(x) = e^{4x}$

6 $f(x) = (\ln x)^3$

7 $f(x) = (9x + 2)^{\frac{2}{3}}$

8 $f(x) = \sqrt[4]{2x^2 + 3}$

9 $f(x) = 5(x^3 + 3x)^4$

10 $f(x) = e^{4x^3}$

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