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# QUIZ 3.1 – 3.6

**1.** Find the derivative of each of the following. Be sure to simplify when possible. [12]

a) $y = \cos^2(2-x)$

$y' = 2\cos(2-x)\cdot(-\sin(2-x))\cdot(-1)$

$y' = 2\cos(2-x)\sin(2-x)$ y'//z/sin(2x

2

b) $y = cotx\ (secx - 3)$

$y' = -\csc^2 x\,(\sec x - 3) + \sec x \tan x \cdot \cot x$

$y' = -\csc^2 x\,(\sec x - 3) + \sec x$ y'//z/sec

2

c) $y = \sqrt{(3x-1)cosx}$

$y' = \frac{1}{2\sqrt{(3x-1)\cos x}} \cdot \left[3\cos x - (3x-1)\sin x\right]$

2

d) $y = (4x-2)^{-4}(2x+1)^2$

$y' = -4(4x-2)^{-5}\cdot 4(2x+1)^2 + (4x-2)^{-4}\cdot 2(2x+1)\cdot 2$

$= -\frac{16(2x+1)^2}{(4x-2)^5} + \frac{4(2x+1)}{(4x-2)^4} = \frac{4(2x+1)\left[4x-2-4(2x+1)\right]}{(4x-2)^5}$

$= \frac{4(2x+1)(-4x-6)}{(4x-2)^5}$

$= \frac{-8(2x+1)(2x+3)}{(4x-2)^5}$

2

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

$y' = \frac{\left(\frac{1}{\sqrt{x}} - 3\right)(5x^3-1) - 15x^2(2\sqrt{x}-3x)}{(5x^3-1)^2}$

2

y'//z

f) $y = \sec(3 - sinx))$

$y' = \sec(3-\sin x)\tan(3-\sin x)\cdot(-\cos x)$

2

**2.** Find the equation of the tangent line to $f(x) = 5\sqrt{\frac{x-2}{x+1}}$ at the point where $x = 3$. [3]

$f'(x) = 5 \cdot \frac{\sqrt{x+1}}{2\sqrt{x-2}} \cdot \frac{x+1-(x-2)}{(x+1)^2}$ $\quad f'(3) = \frac{15}{16}$ $\quad$ Point $(3, \frac{5}{2})$

$= \frac{15\sqrt{x+1}}{2\sqrt{x-2}\,(x+1)^2}$ $\quad \Rightarrow \boxed{y - \frac{5}{2} = \frac{15}{16}(x-3)}$

3

3. A particle's position along a number line is given by $s(t) = 9t^2 - 18t$, for $t \geq 0$ [5]

a) Find the particle's velocity and acceleration functions.

$v(t) = 18t - 18$

$a(t) = 18$

2

b) When does the particle change direction?

when v changes sign.

| t | 0 | | 1 | | $+\infty$ |
|---|---|---|---|---|---|
| v(t) | | − | 0 | + | |

at $\boxed{t = 1}$

1

c) Find the displacement of the particle in the first 3 seconds.

$s(3) - s(0) = 27 - 0 = \boxed{27}$

1

d) Is the particle speeding up or slowing down when t = 2?

$v(2) = 18 > 0$

$a(2) = 18 > 0$

v and a have the same sign

$\Rightarrow$ speeding up.

1