

⑦ $y = 3x^2 - 2x$ Find equation of a tangent line at $(1, 3)$

$y' = 6x - 2$ $m = 6(1) - 2 = 4$ $y - y_1 = m(x - x_1)$ $y - 3 = 4(x - 1)$ or $y = 4x - 1$

⑧ $s(t) = 3t^3 - t^2 + 2$ Find acceleration at 3 seconds.

$s'(t) = v(t)$ $s''(t) = a(t)$
 $s'(t) = 9t^2 - 2t$ $s''(t) = 18t - 2$ $a(3) = 18(3) - 2 = 54 - 2 = 52$ $a(3) = 52$

⑨ $f(x) = \frac{x^4 - x^2}{x}$ Find Point(s) of Inflection

$f(x) = x^3 - x$ $f'(x) = 3x^2 - 1$ $f''(x) = 6x$ $\frac{6x}{6} = \frac{0}{6}$ $x = 0$ $f(0) = \frac{0^4 - 0^2}{0}$ **None**

⑩ $y = (x^2 - 4)^3$ Find all relative minimums.

$y' = 3(x^2 - 4)^2(2x)$ $0 = 6x(x^2 - 4)^2$
 $y' = 6x(x^2 - 4)^2$ $6x = 0$ & $x^2 - 4 = 0$ $x = 0, \pm 2$
Graph of y' vs x showing a sign change from negative to positive at $x = 0$, which is a local minimum. $y = (0^2 - 4)^3 = -64$ $(0, -64)$

⑪ $y = x^2 - 3x$ x is decreasing at $4 \frac{\text{units}}{\text{sec}}$ Find the rate of y when $x = 3$.

$\frac{dy}{dt} = (2x - 3) \frac{dx}{dt}$ $\frac{dx}{dt} = -4$ at $x = 3$ $\frac{dy}{dt} = (2(3) - 3)(-4) = 3(-4) = -12$

⑫ $A = \pi r^2$

You measure the radius as 4 in. You are correct within .5 in. Find the propagated error of the area.

$dA = 2\pi r dr$ $r = 4 \text{ in}$ $dr = .5 \text{ in}$ $dA = 2\pi(4)(.5) = 4\pi \text{ in}^2$

⑬ $y = \frac{3x}{\sqrt{x^2 - 4}}$ Find horizontal asymptote(s)

$\lim_{x \rightarrow \infty} \frac{3x/x}{\sqrt{\frac{x^2}{x^2} - \frac{4}{x^2}}} = \lim_{x \rightarrow \infty} \frac{3}{\sqrt{1 - \frac{4}{x^2}}} = \lim_{x \rightarrow \infty} \frac{3}{\sqrt{1}} = 3$ $\lim_{x \rightarrow -\infty} \frac{3}{\sqrt{1 - \frac{4}{x^2}}} = \frac{3}{-\sqrt{1}} = -3$ $y = \pm 3$