

Homework 8:

$$\begin{aligned} 4) f(x) &= \frac{x^{\frac{1}{3}} - 4}{x^{\frac{7}{2}}} = \frac{x^{\frac{1}{3}}}{x^{\frac{7}{2}}} - 4x^{-\frac{7}{2}} = x^{\frac{1}{3} - \frac{7}{2}} - 4x^{-\frac{7}{2}} \\ &= x^{\frac{2}{6} - \frac{21}{6}} - 4x^{-\frac{7}{2}} = x^{-\frac{19}{6}} - 4x^{-\frac{7}{2}} \end{aligned}$$

$$f'(x) = -\frac{19}{6}x^{-\frac{25}{6}} + 14x^{-\frac{9}{2}}$$

$$5) f(x) = (x^2 + 3)(x^2 - 3)x^2 = (x^4 - 9)x^2 = x^6 - 9x^2$$

$$f'(x) = 6x^5 - 18x$$

$$3) f(x) = \frac{(x+3)(x+1)}{x^2-49} = \frac{x^2+4x+3}{x^2-49}$$

$$f'(x) = \frac{(x^2-49)(2x+4) - (x^2+4x+3)(2x)}{(x^2-49)^2}$$

Quotient Rule:

If $h(x) = \frac{f(x)}{g(x)}$, then

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

$$8) f(x) = (x^3 - 2x + 1)(3x^3 + 2x^2 - 5x)$$

$$f'(x) = (x^3 - 2x + 1)(9x^2 + 4x - 5) + (3x^3 + 2x^2 - 5x)(3x^2 - 2)$$

$$7) f(x) = (3 - 5xe^x)(3x + 2) = 9x + 6 - 15x^2e^x - 10xe^x$$

$$f'(x) = 9 - (15x^2e^x + 30xe^x) - (10xe^x + 10e^x)$$

$$= 9 - 15x^2e^x - 30xe^x - 10xe^x - 10e^x$$

$$= 9 - 15x^2e^x - 40xe^x - 10e^x$$

Homework 7:

$$4) f(x) = -x^3 + 9x^2 - 6x + 9 \quad \text{tangent line @ } (7, 65)$$

$$f'(x) = -3x^2 + 18x - 6$$

$$f'(7) = -3 \cdot 49 + 126 - 6 \\ = -27$$

$$y - 65 = -27(x - 7)$$

$$y - 65 = -27x + 189$$

$$y = -27x + 254$$

$$6) f(x) = -3x^3 - 45x^2 - 225x - 375$$

$$f'(x) = -9x^2 - 90x - 225$$

$$f''(x) = -18x - 90$$