Calculus I Section 2.3 Homework

1) $g(x) = \left(x^3 + 4\right)\left(x - 7\right)$

Let F = First Factor; S = Second Factor

a) $\mathrm{D_x}\left(\mathrm{F}\right)$ = _____?_____

b) $\mathrm{D_x}\left(\mathrm{S}\right)$ = _____?_____

c) $g'(x) = F \cdot \mathrm{D_x}\left(\mathrm{S}\right) + S \cdot \mathrm{D_x}\left(\mathrm{F}\right) =$ ____?_____

2) $f(x) = x^2 \sin x$

Let F = First Factor; S = Second Factor

a) $\mathrm{D_x}\left(\mathrm{F}\right)$ = _____?_____

b) $\mathrm{D_x}\left(\mathrm{S}\right)$ = _____?_____

c) $f'(x) = F \cdot \mathrm{D_x}\left(\mathrm{S}\right) + S \cdot \mathrm{D_x}\left(\mathrm{F}\right) =$ ____?_____

3) $f(x) = \dfrac{4x}{x^2 + 3}$

Let N = Numerator Factor; D = Denominator Factor

a) $\mathrm{D_x}\left(\mathrm{N}\right)$ = _____?_____

b) $\mathrm{D_x}\left(\mathrm{D}\right)$ = _____?_____

c) $f'(x) = \dfrac{D \cdot \mathrm{D_x}\left(N\right) + N \cdot \mathrm{D_x}\left(D\right)}{D^2} =$ ____?_____

4) $h(x) = \dfrac{\sqrt{x}}{x^4 + 5}$

Let N = Numerator Factor; D = Denominator Factor

a) $\mathrm{D_x}(\mathrm{N})$ = _____?_____

b) $\mathrm{D_x}(\mathrm{D})$ = _____?_____

c) $h'(x) = \dfrac{D \cdot \mathrm{D_x}(N) + N \cdot \mathrm{D_x}(D)}{D^2}$ = ____?_____

5) $g(x) = \dfrac{\cos x}{x}$

Let N = Numerator Factor; D = Denominator Factor

a) $\mathrm{D_x}(\mathrm{N})$ = _____?_____

b) $\mathrm{D_x}(\mathrm{D})$ = _____?_____

c) $g'(x) = \dfrac{D \cdot \mathrm{D_x}(N) + N \cdot \mathrm{D_x}(D)}{D^2}$ = ____?_____

6) $f(x) = \left(x^2 + 5x\right)\left(2x^2 + 5x - 5\right)$

Let F = First Factor; S = Second Factor

a) $\mathrm{D_x}(\mathrm{F})$ = _____?_____

b) $\mathrm{D_x}(\mathrm{S})$ = _____?_____

c) $f'(x) = F \cdot \mathrm{D_x}(\mathrm{S}) + S \cdot \mathrm{D_x}(\mathrm{F})$ = ____?_____

d) $f'(0)$ = _____?_____

e) What is the relationship between $f'(0)$ and the tangent line passing through (0.-5)?

7) $f(x) = x \sin x$

Let F = First Factor; S = Second Factor

a) $D_x(F)$ = _____?_____

b) $D_x(S)$ = _____?_____

c) $f'(x) = F \cdot D_x(S) + S \cdot D_x(F)$ = ____?_____

d) $f'(\pi/4)$ = _____?_____

e) What is the relationship between $f'(\pi/4)$ and the tangent line passing through $(\pi/4, \frac{\pi\sqrt{2}}{8})$?

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

Let N = Numerator Factor; D = Denominator Factor

a) $D_x(N)$ = _____?_____

b) $D_x(D)$ = _____?_____

c) $f'(x) = \frac{D \cdot D_x(N) + N \cdot D_x(D)}{D^2}$ = ____?_____

9) $f(x) = \frac{4x - 5}{\sqrt{x}}$

Let N = Numerator Factor; D = Denominator Factor

a) $D_x(N)$ = _____?_____

b) $D_x(D)$ = _____?_____

c) $f'(x) = \frac{D \cdot D_x(N) + N \cdot D_x(D)}{D^2}$ = ____?_____

10) $f(x) = \dfrac{4 - \dfrac{1}{x}}{x+5}$

Hint:Simplify $f(x)$ first; $\quad c - \dfrac{b}{x} = \dfrac{cx-b}{x}; \qquad \dfrac{a/b}{c/d} = \dfrac{a}{b} \cdot \dfrac{d}{c}$

Let N = Numerator Factor; D = Denominator Factor

a) $\mathrm{D_x}(\mathrm{N})$ = _____?_____

b) $\mathrm{D_x}(\mathrm{D})$ = _____?_____

c) $f'(x) = \dfrac{D \cdot \mathrm{D_x}(N) \; + \; N \cdot \mathrm{D_x}(D)}{D^2} =$ _____?_____

11) $f(x) = x^2 \sin x$

Let F = First Factor; S = Second Factor

a) $\mathrm{D_t}(\mathrm{F})$ = _____?_____

b) $\mathrm{D_t}(\mathrm{S})$ = _____?_____

c) $f'(t) = F \cdot \mathrm{D_t}(\mathrm{S}) \; + \; S \cdot \mathrm{D_t}(\mathrm{F}) =$ _____?_____

12) $f(x) = -4x + \tan x$

a) $\mathrm{D_x}(\tan x)$ = _____?_____ (see Formula List)

b) $f'(x) =$ _____?_____

13) $y = \dfrac{4(1-\cos x)}{5\sin x}$

Let N = Numerator Factor; D = Denominator Factor

a) $D_x(N)$ = _____?_____

b) $D_x(D)$ = _____?_____

c) $f'(x) = \dfrac{D \cdot D_x(N) + N \cdot D_x(D)}{D^2}$ = _____?_____

14) $f(x) = \tan x \cot x$

Let F = First Factor; S = Second Factor

a) $D_x(F)$ = _____?_____

b) $D_x(S)$ = _____?_____

c) $f'(x) = F \cdot D_x(S) + S \cdot D_x(F)$ = _____?_____

d) $f'(1)$ = _____?_____

e) What is the relationship between $f'(1)$ and the tangent line passing through (1,1)?

15) $f(x) = \cos x(5 + \sin x)$

Let F = First Factor; S = Second Factor

a) $D_x(F)$ = _____?_____

b) $D_x(S)$ = _____?_____

c) $f'(x) = F \cdot D_x(S) + S \cdot D_x(F)$ = _____?_____

d) $f'(0)$ = _____?_____

e) What is the relationship between $f'(0)$ and the tangent line passing through (0,5)?

16) $f(x) = \left(x^2 + 3x + 5\right)\left(x - 5\right)$ Find equation of tangent line at (1, 5)

Let F = First Factor; S = Second Factor

a) $\mathrm{D_x}\left(\mathrm{F}\right)$ = _____?_____

b) $\mathrm{D_x}\left(\mathrm{S}\right)$ = _____?_____

c) $f'(x) = F \cdot \mathrm{D_x}\left(\mathrm{S}\right) + S \cdot \mathrm{D_x}\left(\mathrm{F}\right)$ = ____?_____

d) Find Slope of tangent line = $f'(1)$ = _____?_____

e) Equation of tangent line: _____?_____

Formula for equation of tangent line: $y - y_1 = m(x - x_1)$

17) $f(x) = \dfrac{x}{x+6}$ Find tangent line at (1, 1/7)

Let N = Numerator Factor; D = Denominator Factor

a) $\mathrm{D_x}\left(\mathrm{N}\right)$ = _____?_____

b) $\mathrm{D_x}\left(\mathrm{D}\right)$ = _____?_____

c) $f'(x) = \dfrac{D \cdot \mathrm{D_x}\left(N\right) + N \cdot \mathrm{D_x}\left(D\right)}{D^2}$ = ____?_____

d) Find Slope of tangent line = $f'(1)$ = _____?_____

e) Equation of tangent line: _____?_____

Formula for equation of tangent line: $y - y_1 = m(x - x_1)$