2.3b - Derivatives of exponential e^x and log functions

p. 190-193 #23, 25, 35, 39, 59

$* \frac{d}{dx} e^u = e^u \cdot u'$

$* \frac{d}{dx} \ln u = \frac{u'}{u}$

23) $f(x) = 4e^x$ $\boxed{f'(x) = 4e^x}$

25) $f(u) = 5u^2 - 2e^u$

$\boxed{f'(u) = 10u - 2e^u}$

35) a) Find slope of tangent line
b) equation of tangent line
c) equation of normal line
d) Graph tangent and normal line

$f(x) = e^x + 5x$ at $(0,1)$

a) $f'(x) = e^x + 5$ $f'(0) = e^0 + 5 = 1 + 5 = 6$ $\boxed{f'(0) = 6}$

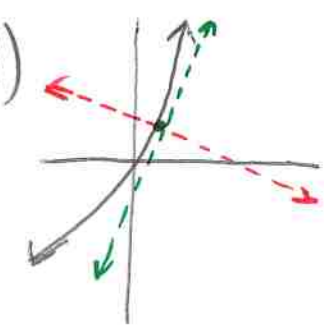
b) point: $(0,1)$ slope: $m = 6$

$y - y_1 = m(x - x_1)$

$\boxed{y - 1 = 6(x - 0)}$

c) slope of normal line: $m_2 = -1/6$ point: $(0,1)$

$\boxed{y - 1 = -1/6(x - 0)}$

d) 

39) a) Find point where graph of f has horizontal tangent line

b) Find equation of horizontal tangent line

c) Solve inequality $f'(x) > 0$

d) Solve inequality $f'(x) < 0$

e) Graph f and horizontal lines

f) Describe graph of f in relation to c and d

a) $f(x) = x + e^x$ | $0 \neq 1 + e^x$ | None. $f'(x)$ is never equal to zero.

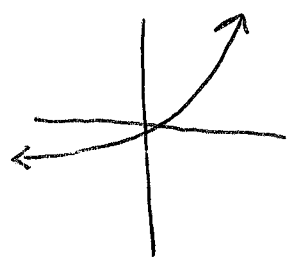
$f'(x) = 1 + e^x$ | $-1 = e^x$ | There is no horizontal tangent line

b) No horizontal tangent line.

c) $f'(x) = 1 + e^x > 0$ $f'(x)$ always greater than 0, so all Real numbers

d) $f'(x)$ never less than 0, so no solutions

e)



f) For every x, $f'(x) > 0$, and graph of f is increasing for all x.

$\boxed{2.36}$

59) Find equation of tangent line parallel to L

$f(x) = e^x$ $\quad\quad$ $L: y - x - 5 = 0 \rightarrow y = x + 5$

slope: $m = 1$

$f'(x) = e^x$

$1 = e^x \rightarrow x = 0$

$f(0) = e^0 = 1$

point: $(0,1)$ $\quad$ slope: $m = 1$

$y - y_1 = m(x - x_1)$

$\boxed{y - 1 = 1(x - 0)}$ or $\boxed{y = x + 1}$