MATH 1101, practice problems for Midterm 2
Answer key

1.a) $\frac{\cos(x)\ln(x)-\sin(x)/x}{\ln^2(x)}$

b) $e^x + xe^x$

c) $-\frac{e^{\ln(2+x)-\ln(1+x)}}{(1+x)(2+x)}$.

d) $\sin(x)^{\cos(x)}\left(\frac{\cos^2(x)}{\sin x} - \sin(x)\ln(\sin(x))\right)$

e) $\left(\frac{\sqrt{x+1}}{\sqrt{x-1}}\right) \cdot \frac{1}{(1+x)^2}$.

2. a) $y' = -3x/2y$

b) $y' = -\sin(x)/\sin(y)$

c) $y' = y/x$

3. $y = 3e^{-1}x - 2e^{-1}$

4. a) $\min = 0, \max = 4 + \sin(4)$

b) $\min = -53, \max = 55$

c) $\min = 0, \max = \ln(2)/2$.

5. a) $f'(x) = 1/\sqrt{x} - 1$,function is defined for $x \geq 0$, increasing on $[0,1]$, decreasing on $[1,+\infty)$.

b) $f'(x) = \frac{e^x(x-2)}{x^3}$, function is defined for $x \neq 0$, increasing on $(-\infty, 0)$ and on $(2,+\infty)$ and decreasing on $(0,2)$.

c) $f'(x) = 4x^3 - 4$, The function is defined everywhere, it decreases on $(-\infty, 1]$ and increases on $(1,+\infty)$.

d) $f'(x) = \frac{2x-3}{x^2-2x+3}$,The function is defined for $x < 1$ and for $x > 2$, it is decreasing on $x < 1$, it is increasing for $x > 2$.

6. 9×18 in.

7. $1/\sqrt{5}$

8. $\$125$.