

MATH 21A, practice problems for Midterm 2 Answer key

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

b) $(1 - x \sin x)e^{\cos x}$

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) $y' = y/x$

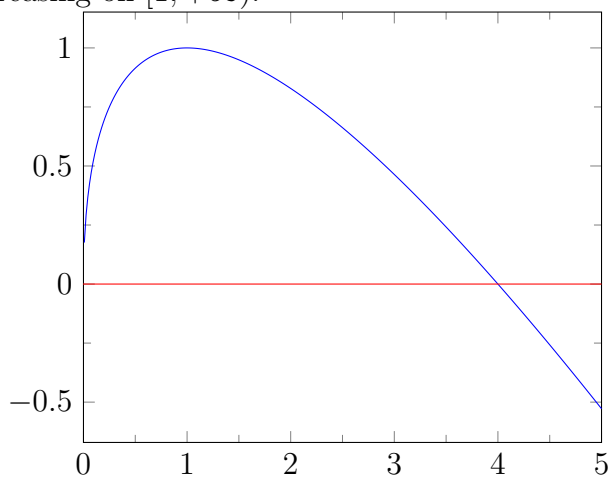
3. $y = 3e^{-1}x - 2e^{-1}$

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

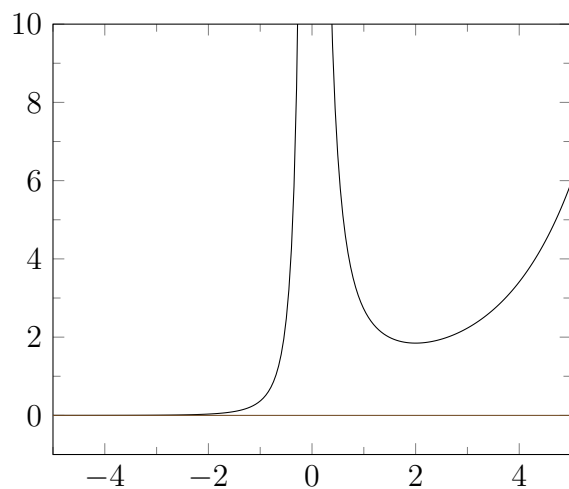
b) $\min = -53, \max = 55$

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

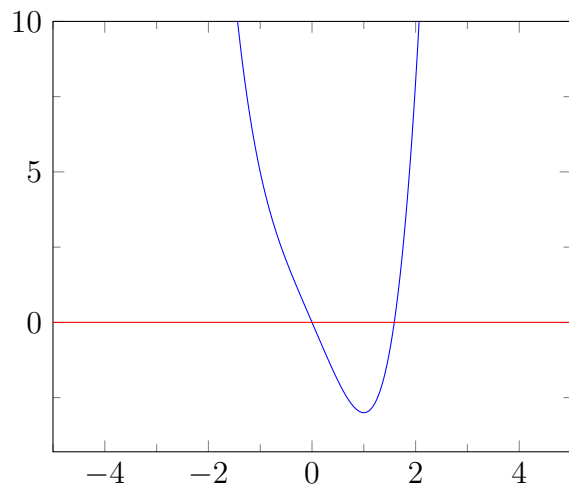
5. a) $f'(x) = 1/\sqrt{x} - 1$, function is defined for $x \geq 0$, increasing on $[0, 1]$, decreasing on $[1, +\infty)$.



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 $(0, 2)$. There is a vertical asymptote at $x = 0$ and horizontal asymptote $y = 0$ at $x \rightarrow -\infty$.



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 $x > 2$. There are vertical asymptotes at $x = 1$ and $x = 2$.

