Lesson 26 (even problems must be solved in class, odd examples must be solved at home)

Investigate the following functions and construct their graphs:

81. $y=x^4-2x+10$. **82.** $y=\frac{8a^3}{x^2+4a^2}$. **83.** $y=e^{-\frac{1}{x}}$. **84.** $y=\frac{6x}{1+x^2}$. **85.** $y=\frac{4+x}{x^2}$. **86.** $y=\frac{x}{x^2-1}$. **87.** $y=\frac{x+2}{x^3}$. **88.** $y=\frac{x^2}{1+x}$. **89.** $y^2=x^3-x$. **90.** $y=\frac{x^3}{3-x^2}$. **91.** $y=\sqrt[3]{x^2}+2$. **92.** $y=x-\sqrt[3]{x^3+1}$. **93.** $y=\sqrt{\frac{x-1}{x+1}}$.

94. $y=xe^{-x}$. **95.** $y=x^2e^{-x^2}$. **96.** $y=x-\ln(x+1)$. **97.** $y=\ln(x^2+1)$.

98. $y=\sin 3x$. **99.** $y=x+\sin x$. **100.** $y=x\sin x$. **101.** $y=e^{-x}\sin x$.

102. $y=\ln\sin x$. **103.** $y=\frac{\ln x}{x}$. **104.** $\begin{cases} x=t^2, \\ y=\frac{1}{2}t. \end{cases}$ **105.** $\begin{cases} x=t^2, \\ y=t^3. \end{cases}$

106. $\begin{cases} x=a(t-\sin t), \\ y=a(1-\cos t). \end{cases}$ **107.** $\begin{cases} x=ae^t\cos t, \\ y=ae^t\sin t. \end{cases}$

Additional Exercises

Find the asymptotes of the following lines:

108. $y=\frac{x^2+1}{1+x}$. *Ans.* $x=-1$, $y=x-1$. **109.** $y=x+e^{-x}$. *Ans.* $y=x$.

110. $2y(x+1)^2=x^3$. *Ans.* $x=-1$, $y=\frac{1}{2}x-1$. **111.** $y^3=a^3-x^2$. *Ans.* No asymptotes. **112.** $y=e^{-2x}\sin x$ *Ans.* $y=0$. **113.** $y=e^{-x}\sin 2x+x$. *Ans.* $y=x$.

114. $y=x\ln\left(e+\frac{1}{x}\right)$. *Ans.* $x=-\frac{1}{e}$, $y=x+\frac{1}{e}$. **115.** $y=xe^{\frac{1}{x^2}}$. *Ans.* $x=0$, $y=x$. **116.** $x=\frac{2t}{1-t^2}$, $y=\frac{t^2}{1-t^2}$. *Ans.* $y=\pm\frac{1}{2}x-\frac{1}{2}$.

Investigate and graph the following functions:

117. $y=|x|$. **118.** $y=\ln|x|$. **119.** $y^2=x^3-x$. **120.** $y=(x+1)^2(x-2)$.

121. $y=x+|x|$. **122.** $y=\sqrt[3]{x^2}-x$. **123.** $y=x^2\sqrt{x+1}$. **124.** $y=\frac{x^2}{2}-\ln x$.

125. $y=\frac{x^2}{2}\ln x$. **126.** $y=\frac{1}{e^x-1}$. **127.** $y=\frac{x}{\ln x}$. **128.** $y=x+\frac{\ln x}{x}$. **129.** $y=x\ln x$. **130.** $y=e^{\frac{1}{x}}-x$. **131.** $y=|\sin 3x|$. **132.** $y=\frac{\sin x}{x}$. **133.** $y=x\arctan x$.

134. $y=x-2\arctan x$. **135.** $y=e^{-2x}\sin 3x$. **136.** $y=|\sin x|+x$. **137.** $y=\sin(x^2)$.

138. $y=\cos^3 x+\sin^3 x$. **139.** $y=\frac{x+|x|}{2}$. **140.** $y=\frac{x-|x|}{2}$. **141.** $y=\sin\left(\frac{x+|x|}{2}\right)-\frac{x-|x|}{2}$ $(-\pi\leqslant x\leqslant\pi)$. **142.** $y=\cos\left(\frac{x-|x|}{2}\right)-\frac{x+|x|}{2}\left(-\frac{\pi}{2}\leqslant x\leqslant 1\right)$. **143.** $y=\frac{1}{2}(3x+|x|)+1$. **144.** $y=\frac{1}{2}[3(x-1)+|x-1|]+1$ $(0\leqslant x\leqslant 2)$.