Lesson 25 (even problems must be solved in class, odd examples must be solved at home)

Determine the points of inflection and the intervals of convexity and concavity of the following curves:

62. $y=x^5$. *Ans.* For $x<0$ the curve is convex; for $x>0$ the curve is concave; at $x=0$ there is a point of inflection. **63.** $y=1-x^2$. *Ans.* The curve is everywhere convex. **64.** $y=x^3-3x^2-9x+9$. *Ans.* Point of inflection at $x=1$. **65.** $y=(x-b)^3$. *Ans.* Point of inflection at $x=b$. **66.** $y=x^4$. *Ans.* The curve is everywhere concave. **67.** $y=\frac{1}{x^2+1}$. *Ans.* Point of inflection at $x=\pm\frac{1}{\sqrt{3}}$. **68.** $y=\tan x$. *Ans.* Point of inflection at $x=n\pi$. **69.** $y=xe^{-x}$. *Ans.* Point of inflection at $x=2$. **70.** $y=a-\sqrt[3]{x-b}$. *Ans.* Point of inflection at $x=b$. **71.** $y=a-\sqrt[5]{(x-b)^2}$. *Ans.* The curve has no point of inflection.

Find the asymptotes to the following curves:

72. $y=\frac{1}{x-1}$. *Ans.* $x=1$, $y=0$. **73.** $y=\frac{1}{(x+2)^3}$. *Ans.* $x=-2$, $y=0$. **74.** $y=c+\frac{a^3}{(x-b)^2}$. *Ans.* $x=b$, $y=c$. **75.** $y=e^{\frac{1}{x}}-1$. *Ans.* $x=0$, $y=0$. **76.** $y=\ln x$. *Ans.* $x=0$. **77.** $y^3=6x^2+x^3$. *Ans.* $y=x+2$. **78.** $y^3=a^3-x^3$. *Ans.* $y+x=0$. **79.** $y^2=\frac{x^3}{2a-x}$. *Ans.* $x=2a$. **80.** $y^2(x-2a)=x^3-a^3$. *Ans.* $x=2a$, $y=\pm(x+a)$.