**Mathematics for Economists I**
**Problems 4**

## Domain of definition

Find the domain of definition of the given function:

**1.** $\frac{x+3}{x-5}$ **2.** $\sqrt{\frac{x+1}{x-2}}$

**3.** $\sqrt{3-x}$ **4.** $\frac{x+1}{x^2+x-6}$

**5.** $\sqrt{x+4}$ **6.** $\sqrt[3]{x^2-7x+2}$

**7.** $\sqrt{x^2+x-12}$ **8.** $\sqrt[4]{x^3-x^2-5x-3}$

**9.** $\sqrt{\frac{x^2-2x-15}{x-1}}$ **10.** $\ln(x-2)$

**11.** $\ln(x^2-9)$ **12.** $\log_{10}(\frac{x+2}{3x-4})$

**13.** $\log_{1/2}(\frac{1}{2-x})+\frac{1}{x+5}$ **14.** $e^{(x^2-4x+1)}$

**15.** $e^{x-1}-\ln(x+3)$ **16.** $6^{3x}+\sqrt{2x+3}$

Find the domain of definition of the given function, as well as its intercepts with axes and intervals where the function is positive/negative.

**17.** $\frac{\sqrt{x^2-7x+10}}{4-x}$ **18.** $\frac{\sqrt{x-2}}{-x^2+2x+3}$

**19.** $\frac{-x^2+4x+5}{x^2-8x+12}$ **20.** $\frac{2x^2-8x+6}{-x^2+6x+7}$

**21.** $\frac{\sqrt{-x^2+4x+5}}{3-x}$ **22.** $\frac{3x^2+9x}{x^2+3x-10}$

**Solution:**

**1.** $(-\infty,5)\cup(5,+\infty)$, **2.** $(-\infty,-1\rangle\cup(2,+\infty)$, **3.** $(-\infty,3\rangle$,

**4.** $(-\infty,-3)\cup(-3,2)\cup(2,+\infty)$, **5.** $\langle-4,+\infty)$, **6.** $\mathbb{R}$,

**7.** $(-\infty,-4\rangle\cup\langle3,+\infty)$, **8.** $\{-1\}\cup\langle3,+\infty)$, **9.** $\langle-3,1)\cup\langle5,+\infty)$,

**10.** $(2,+\infty)$, **11.** $(-\infty,-3)\cup(3,+\infty)$, **12.** $(-\infty,-2)\cup(\frac{4}{3},+\infty)$,

**13.** $(-\infty,-5)\cup(-5,2)$, **14.** $\mathbb{R}$, **15.** $(-3,+\infty)$, **16.** $\langle-\frac{3}{2},+\infty)$,

**17.** $+(-\infty,2\rangle,-\langle5,+\infty)$, **18.** $+\langle2,3),-(3,+\infty)$,

**19.** $-(-\infty,-1),+(-1,2),-(2,5),+(5,6),-(6,\infty)$,

**20.** $-(-\infty,-1),+(-1,1),-(1,3),+(3,7),-(7,\infty)$,

**21.** $+\langle-1,3),-(3,5\rangle$,

**22.** $+(-\infty,-5)-(-5,-3),+(-3,0),-(0,2),+(2,+\infty)$.