ECEN/MAE 3723 Systems I
Fall 2006
Quiz #2
Section 002
September 19, 2006

Name: SOLUTION

Problem 1: Find the Inverse Laplace transform of

$$X(s)=\frac{2s^2-s}{s^2+s+3}.$$

$$= 2-\frac{3s+6}{s^2+s+3}$$

$$= 2-\frac{3s+6}{\left(s^2+s+\frac{1}{4}\right)+\left(3-\frac{1}{4}\right)}$$

$$= 2-\frac{3\left(s+\frac{1}{2}\right)+\left(\frac{9}{2}\frac{2}{\sqrt{11}}\right)\frac{\sqrt{11}}{2}}{\left(s+\frac{1}{2}\right)^2+\left(\frac{\sqrt{11}}{2}\right)^2}$$

$$= 2-\frac{3\left(s+\frac{1}{2}\right)}{\left(s+\frac{1}{2}\right)^2+\left(\frac{\sqrt{11}}{2}\right)^2}-\frac{9}{\sqrt{11}}\frac{\frac{\sqrt{11}}{2}}{\left(s+\frac{1}{2}\right)^2+\left(\frac{\sqrt{11}}{2}\right)^2}$$

$$x(t)=\mathcal{L}^{-1}[X(s)]$$

$$=\left[2\delta(t)-3\cos\frac{\sqrt{11}}{2}t\,e^{-\frac{1}{2}t}-\frac{9}{\sqrt{11}}\sin\frac{\sqrt{11}}{2}t\,e^{-\frac{1}{2}t}\right]u(t)$$