**Problem 17) Method 1**:

$$F(s)=\int_{-\infty}^{\infty} f(x)\exp(-\mathrm{i}2\pi sx)\mathrm{d}x=\int_{-3/4}^{3/4}\cos(2\pi x)\exp(-\mathrm{i}2\pi sx)\mathrm{d}x$$

$$=\tfrac{1}{2}\int_{-3/4}^{3/4}[\exp(\mathrm{i}2\pi x)+\exp(-\mathrm{i}2\pi x)]\exp(-\mathrm{i}2\pi sx)\mathrm{d}x$$

$$=\tfrac{1}{2}\int_{-3/4}^{3/4}\{\exp[\mathrm{i}2\pi(1-s)x]+\exp[-\mathrm{i}2\pi(1+s)x]\}\mathrm{d}x$$

$$=\frac{\exp[\mathrm{i}(3\pi/2)(1-s)]-\exp[-\mathrm{i}(3\pi/2)(1-s)]}{\mathrm{i}4\pi(1-s)}+\frac{\exp[-\mathrm{i}(3\pi/2)(1+s)]-\exp[\mathrm{i}(3\pi/2)(1+s)]}{-\mathrm{i}4\pi(1+s)}$$

$$=\frac{2\mathrm{i}\sin[(3\pi/2)(1-s)]}{\mathrm{i}4\pi(1-s)}+\frac{-2\mathrm{i}\sin[(3\pi/2)(1+s)]}{-\mathrm{i}4\pi(1+s)}=\tfrac{3}{4}\{\mathrm{sinc}[3(s-1)/2]+\mathrm{sinc}[3(s+1)/2]\}.$$

**Method 2**: $f(x)=\mathrm{Rect}(2x/3)\cos(2\pi x)$. Therefore, using the scaling and convolution theorems along with the fact that $\mathscr{F}\{\exp(\pm\mathrm{i}2\pi s_o x)\}=\delta(s\mp s_o)$, we will have

$$F(s)=\tfrac{3}{2}\mathrm{sinc}(3s/2)*\tfrac{1}{2}[\delta(s-1)+\delta(s+1)]$$

$$=\tfrac{3}{4}\{\mathrm{sinc}[3(s-1)/2]+\mathrm{sinc}[3(s+1)/2]\}.$$