7.6: 10

a. true; $\frac{\frac{1}{x+3}}{\frac{1}{x}} = \frac{x}{x+3} < 1$ if $x > 1$ (or sufficiently large)

b. true; $\frac{\frac{1}{x}+\frac{1}{x^2}}{\frac{1}{x}} = 1 + \frac{1}{x} < 2$ if $x > 1$ (or sufficiently large)

c. false; $\lim_{x\to\infty} \frac{\frac{1}{x}-\frac{1}{x^2}}{\frac{1}{x}} = \lim_{x\to\infty}(1-\frac{1}{x}) = 1$

d. true; $2+\cos x \leq 3 \Rightarrow \frac{2+\cos x}{2} \leq \frac{3}{2}$ if x is sufficiently large

e. true; $\frac{e^x+x}{e^x} = 1 + \frac{x}{e^x}$ and $\frac{x}{e^x} \to 0$ as $x \to \infty \Rightarrow 1 + \frac{x}{e^x} < 2$ if x is sufficiently large

f. true; $\lim_{x\to\infty} \frac{x\ln x}{x^2} = \lim_{x\to\infty} \frac{\ln x}{x} = \lim_{x\to\infty} \frac{\frac{1}{x}}{1} = 0$

g. true; $\frac{\ln(\ln x)}{\ln x} < \frac{\ln x}{\ln x} = 1$ if x is sufficiently large

h. false; $\lim_{x\to\infty} \frac{\ln x}{\ln(x^2+1)} = \lim_{x\to\infty} \frac{\frac{1}{x}}{\frac{2x}{x^2+1}} = \lim_{x\to\infty} \frac{x^2+1}{2x^2} = \lim_{x\to\infty}\left(\frac{1}{2}+\frac{1}{2x^2}\right) = \frac{1}{2}$

7.7: 4

a. $\frac{\pi}{6}$

b. $-\frac{\pi}{4}$

c. $\frac{\pi}{3}$

7.7: 6

a. $\frac{2\pi}{3}$

b. $\frac{\pi}{4}$

c. $\frac{5\pi}{6}$

7.7: 8

a. $\frac{\pi}{4}$

b. $\frac{5\pi}{6}$

c. $\frac{\pi}{3}$

7.7: 10

a. $-\frac{\pi}{4}$

b. $\frac{\pi}{3}$

c. $-\frac{\pi}{6}$

7.7: 14 $\alpha = \tan^{-1}(\frac{4}{3}) \Rightarrow \sin\alpha = \frac{4}{5},\ \cos\alpha = \frac{3}{5},\ \sec\alpha = \frac{5}{3},\ \csc\alpha\frac{5}{4},$ and $\cot\alpha = \frac{3}{4}$

7.7: 22 $\tan(\sec^{-1} 1) + \sin(\csc^{-1}(-2)) = \tan(\cos^{-1}\frac{1}{1}) + \sin(\sin^{-1}(-\frac{1}{2})) = \tan(0) + \sin(-\frac{\pi}{6}) = 0 + (-\frac{1}{2}) = -\frac{1}{2}$

7.7: 24 $\cot(\sin^{-1}(-\frac{1}{2}) - \sec^{-1} 2) = \cot(-\frac{\pi}{6} - \cos^{-1}(\frac{1}{2})) = \cot(-\frac{\pi}{6} - \frac{\pi}{3}) = \cot(-\frac{\pi}{2}) = 0$

7.7: 32 $\alpha = \sec^{-1}\frac{y}{5}$ indicates the diagram $\Rightarrow \tan\left(\sec^{-1}\frac{y}{5}\right) = \tan\alpha = \frac{\sqrt{y^2-25}}{5}$

7.7: 36 $\alpha = \tan^{-1}\frac{x}{\sqrt{x^2+1}}$ indicates the diagram $\Rightarrow \sin\left(\tan^{-1}\frac{x}{\sqrt{x^2+1}}\right) = \sin\alpha = \frac{x}{\sqrt{2x^2+1}}$

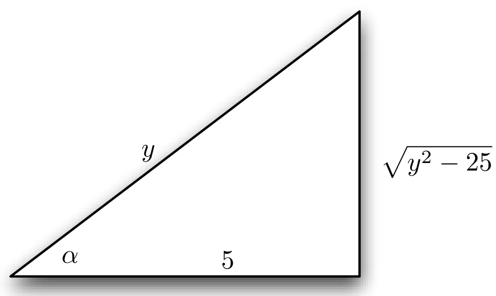

Figure 1: Problem 7.7: 32

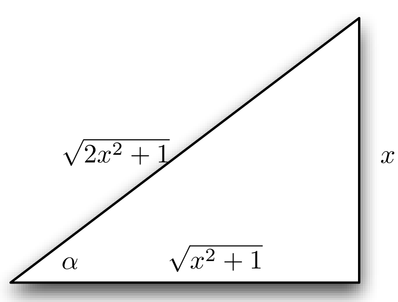

Figure 2: Problem 7.7: 36