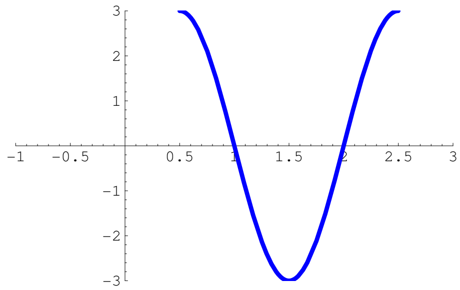
Solutions to Sample Problems for Exam 3 Math 1155 Rogness

Here are some solutions to the sample problems.

(1) Given $y = 3\cos(\pi x - \frac{\pi}{2})$, the amplitude is 3, the period is 2, and the phase shift is 1/2. Here's a graph of one cycle.



(2) If $\sin\theta$ is positive and $\cos\theta < 0$, we must be in quadrant II. You can even figure out what triangle to use; since $\sin\theta = \frac{1}{2} = \frac{y}{r}$, this is a $30 - 60 - 90$ triangle where $x = -\sqrt{3}$. Hence

$$\sin\theta = \frac{y}{r} = \frac{1}{2} \qquad \csc\theta = \frac{r}{y} = \frac{2}{1}$$

$$\cos\theta = \frac{x}{r} = -\frac{\sqrt{3}}{2} \qquad \sec\theta = \frac{r}{x} = -\frac{2}{\sqrt{3}}$$

$$\tan\theta = \frac{y}{x} = -\frac{1}{\sqrt{3}} \qquad \cot\theta = \frac{x}{y} = -\frac{\sqrt{3}}{1}$$

(3) You can check these with a calculator; they're all found using $45 - 45 - 90$ triangles.

(4) Show that

$$\frac{\cot(\theta)\sin(\theta)}{\sec(\theta)} + \frac{1}{\csc^2(\theta)} = \frac{\frac{\cos(\theta)}{\sin(\theta)}\sin(\theta)}{\frac{1}{\cos(\theta)}} + \frac{\sin^2(\theta)}{1} = \frac{\cos(\theta)}{1}\frac{\cos(\theta)}{1} + \sin^2(\theta)$$
$$= \cos^2(\theta) + \sin^2(\theta) = 1$$

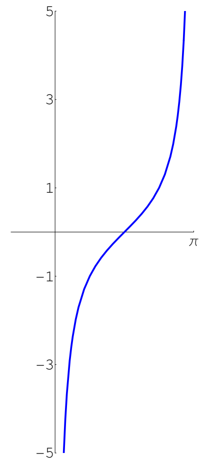
(5) In order, on the unit circle,

$(1,0)$, $(\sqrt{3}/2, 1/2)$, $(1/\sqrt{2}, 1/\sqrt{2})(1/2, \sqrt{3})$, $(-1/2, \sqrt{3})$, $(-1/\sqrt{2}, 1/\sqrt{2})$, $(-\sqrt{3}/2, 1/2)$, $(-1, 0)$

(6) $\cos^{-1}(\cos(-\pi/4)) = \cos^{-1}(1/\sqrt{2}) = \pi/4$, because $\cos^{-1}$ returns values between 0 and π.

(7) $95°$ is approximately 1.6581 radians. 1 radian is about $57.2958°$.

(8) One cycle of the graph of $y = \tan\left(x - \frac{\pi}{2}\right)$ is shown here.



(9) Other Problems. (Ask me about any other problems; let me know if I've made a typo here so I can correct it for other people.)

Ch4Rev 90: : \$20398.87; 4.04; 17.5yrs
Ch4Rev 91: : \$41668.97
Ch5Rev 1: : $3\pi/4$
Ch5Rev 5: : $135°$
Ch5Rev 25: : 1
Ch5Rev 61: : Amplitude = 8; period = 4.
Ch5Rev 69: : Amplitude = 2/3; period = 2; phase shift = $6/\pi$.
Ch5Rev 71: : $y = 5\cos\frac{x}{4}$
Ch6Rev 5: : $5\pi/6$
Ch6Rev 11: : $2\sqrt{3}/3$
Ch6Rev 13: : 3/5
Ch6Rev 17: : $-\pi/6$
Ch6Rev 21: : Hint: $\tan\theta\cot\theta = 1$.
Ch6Rev 35: : (This is harder than what you'd have to do on an exam....)