These solutions don't include all of the details, so please ask us if you can't figure out why an answer is correct.

(1) Multiple Choice

(i) (a). Statement **(B)** is false unless $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$.

(ii) (b). One solution is shown here:

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

(iii) (a). $\sin\theta$ is an odd function, and $\cos\theta$ is an even function.

(iii) (c), i.e. the third graph from the left.

(2) (a) If $\cos\theta < 0$ and $\tan\theta > 0$, then $\theta$ is in Quadrant III. Specifically, draw a circle of radius $r = 5$; then if you draw $\theta$ it should intersect the circle in Quadrant III at a point $(x, y) = (-4, y)$. Using the equation of a circle (or by drawing a right triangle and using the Pythagorean identity, which amounts to the same thing) you can find that $y = -3$. Then

$$\sin\theta = \frac{y}{r} = -\frac{3}{5}$$
$$\tan\theta = \frac{y}{x} = \frac{3}{4}$$
$$\sec\theta = \frac{r}{x} = -\frac{5}{4}$$

(b) Using the fact that the trig functions are periodic (so we can add/subtract multiples of $2\pi$ to the angles without changing the values),

$$-12\cos\left(\frac{11\pi}{4}\right) + 4\tan\left(-\frac{13\pi}{3}\right) = -12\cos\left(\frac{3\pi}{4}\right) + 4\tan\left(-\frac{\pi}{3}\right)$$
$$= -12\left(-\frac{\sqrt{2}}{2}\right) + 4\left(-\sqrt{3}\right)$$
$$= 6\sqrt{2} - 4\sqrt{3}$$

(3) You need to write down a function $f(x) = A\sin(\omega x - \phi) = A\sin(\omega(x - \phi/\omega))$ such that $|A| = 3$, $T = 2\pi/\omega = 1$ (which implies that $\omega = 2\pi$), and $\phi/\omega = -1/2$. One such function is

$$f(x) = 3\sin(2\pi(x + 1/2))$$

Ask us if you're not sure how to graph a cycle of this function.

(4) Using the equation $A = P\left(1+\frac{r}{n}\right)^{nt}$,

(a)

$$500 = P\left(1+\frac{.05}{12}\right)^{120}$$

$$P = 500/\left(1+\frac{.05}{12}\right)^{120} \cong 303.581 \text{ or } \$303.581 \text{ million}$$

(b)

$$10 = 5\left(1+\frac{.05}{12}\right)^{12t}$$

$$2 = \left(1+\frac{.05}{12}\right)^{12t}$$

$$\ln 2 = \ln\left(1+\frac{.05}{12}\right)^{12t} = 12t\ln\left(1+\frac{.05}{12}\right)$$

$$t = \frac{\ln 2}{12\ln\left(1+\frac{.05}{12}\right)} \cong 13.89 \text{ years}$$

(5) (a) $\cos^{-1}\left(\cos(-\frac{3\pi}{4})\right) = \cos^{-1}(-\sqrt{2}/2)$. By definition of $\cos^{-1} x$, this has to be an angle between 0 and $\pi$ whose cosine is $\sqrt{2}/2$. The only possible angle is $+\frac{3\pi}{4}$.

(b) This is example 7 from your textbook; you can see a solution there.