Self-Test A:

1) θ is in QIV. Draw the angle and a possible reference triangle: use the Pythagorean Theorem to find the hypotenuse, which is 13.
Then $\sin(\theta) = -\frac{5}{13}$, $\cos(\theta) = \frac{12}{13}$, $\sec(\theta) = \frac{13}{12}$, $\csc(\theta) = -\frac{13}{5}$, and $\cot(\theta) = -\frac{12}{5}$

2) Don't forget to draw and label the triangle. You can use the Law of Sines to find $A \approx 22.7°$. Don't forget to round and don't forget the degree sign!

3) a) First rewrite the equation into the form $\cos(x) = -\frac{1}{2}$.
. The cosine is the first coordinate of the point on the unit circle.
Find a point in QII whose first coordinate is $-\frac{1}{2}$.
Draw the reference triangle for that point and find the angle (rotation) that goes with that point.
The reference angle is $\frac{\pi}{3}$, so we can see in the unit circle picture that the angle is $\pi - \frac{\pi}{3} = \frac{2\pi}{3}$.
(You MUST show this in your unit circle!)
Now reflect the reference triangle into QIII to find another point whose first coordinate is also $-\frac{1}{2}$.
Find the angle that goes with that point. We can see in the unit circle picture that the angle is $\pi + \frac{\pi}{3} = \frac{4\pi}{3}$. (You MUST show this in your unit circle!)
So the two solutions are $x = \frac{2\pi}{3}$ and $x = \frac{4\pi}{3}$.

b) $\sin(x) = 1$
The sine is the second coordinate of the point on the unit circle.
Find a point on the unit circle whose second coordinate is 1. There is only one such point: $(0, 1)$.
Find the angle that goes with that point. We can see that the angle is half of π, namely $\frac{\pi}{2}$. That is the only solution to the equation in $[0, 2\pi)$: $x = \frac{\pi}{2}$

c) $\tan(x) = 1$
Remember that the tangent is the ratio $\frac{b}{a}$ of the coordinates of the point (a, b) on the unit circle.
That means that we are looking for points which have both coordinates the same, so their ratio is 1. There are two such points: $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$ and $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$. Find their angles: $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$ has angle $\frac{\pi}{4}$ and the other point, which is in QIII, has angle $\pi + \frac{\pi}{4} = \frac{5\pi}{4}$. So there are two solutions in $[0, 2\pi)$: $x = \frac{\pi}{4}$ and $x = \frac{5\pi}{4}$

4) $0 = 6\sin(40\pi t)$
See the method in the handout and also the worked-out example which I posted on OpenLab (linked in the blog post for Test 4 Review). Make sure that you show all the steps and explain in words what you are doing!
The solutions are $t = 0$ and $t = \frac{1}{40}$.

Self-Test B: allow 50 mintues. Time yourself. Then check your answers and review as needed.

1) θ is in QI1. Draw the angle and a possible reference triangle: use the Pythagorean Theorem to find the side, which is $\sqrt{5}$.
Then $\sin(\theta) = -\frac{\sqrt{5}}{3}$, $\tan(\theta) = \frac{\sqrt{5}}{2}$, $\sec(\theta) = -\frac{3}{2}$, $\csc(\theta) = -\frac{3\sqrt{5}}{5}$ (after rationalizing the denominator), and $\cot(\theta) = \frac{2\sqrt{5}}{5}$ (after rationalizing the denominator)

2) Don't forget to draw and label the triangle. You can use the Law of Cosines to find $c \approx 9.6$. Don't forget to round!

3) a) First rewrite the equation into the form $\sin(x) = \frac{\sqrt{2}}{2}$.
. The sine is the second coordinate of the point on the unit circle.
Find a point in QI whose second coordinate is $\frac{\sqrt{2}}{2}$.
Draw the reference triangle for that point and find the angle (rotation) that goes with that point.
The reference angle is $\frac{\pi}{4}$. (You MUST show this in your unit circle!)
Now reflect the reference triangle into QII to find another point whose first coordinate is also $\frac{\sqrt{2}}{2}$.
Find the angle that goes with that point. We can see in the unit circle picture that the angle is $\pi - \frac{\pi}{4} = \frac{3\pi}{4}$. (You MUST show this in your unit circle!)
So the two solutions are $x = \frac{\pi}{4}$ and $x = \frac{3\pi}{4}$.

b) $\cos(x) = -1$
The cosine is the first coordinate of the point on the unit circle.
Find a point on the unit circle whose first coordinate is -1. There is only one such point: $(-1, 0)$.
Find the angle that goes with that point. We can see that the angle is π. That is the only solution to the equation in $[0, 2\pi)$: $x = \pi$

c) First rewrite the equation into the form $\tan(x) = -\frac{\sqrt{3}}{3}$ Remember that the tangent is the ratio $\frac{b}{a}$ of the coordinates of the point (a, b) on the unit circle. Look for points such that the ratio $\frac{b}{a}$ is $-\frac{\sqrt{3}}{3}$. The two points are $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ and $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$. Their reference angles are $\frac{\pi}{6}$. We can see in the unit circle that their angles are $\pi - \frac{\pi}{6} = \frac{5\pi}{6}$ and $2\pi - \frac{\pi}{6} = \frac{11\pi}{6}$. So there are two solutions in $[0, 2\pi)$: $x = \frac{5\pi}{6}$ and $x = \frac{11\pi}{6}$

4) $3 = 6\sin(40\pi t)$
See the method in the handout and also the worked-out example which I posted on OpenLab (linked in the blog post for Test 4 Review). Make sure that you show all the steps and explain in words what you are doing!
The solutions are $t = \frac{1}{240}$ and $t = \frac{1}{48}$.