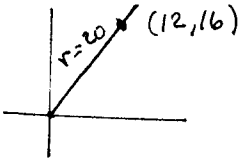
March 5, 2013 Math 104 – Test 1 Name ANSWERS

Suppose that θ is in standard position and the given point is on the terminal side of θ. Give the exact value of the indicated trig function for θ.

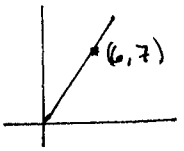
1) (12, 16); Find sin θ.



$r = \sqrt{12^2+16^2} = \sqrt{144+256} = \sqrt{400} = 20$

$\sin\theta = \frac{y}{r} = \frac{16}{20} = \boxed{\frac{4}{5}}$

2) (6, 7); Find cot θ.



$\cot\theta = \frac{x}{y} = \boxed{\frac{6}{7}}$

Find the indicated function value.

3) tan θ, given that $\cot\theta = \frac{\sqrt{11}}{6}$

$\tan\theta = \frac{1}{\cot\theta} = \frac{6}{\sqrt{11}} = \boxed{\frac{6\sqrt{11}}{11}}$

Decide whether the statement is possible or impossible for an angle θ. Explain your answer!

4) $\sin\theta = 1.04$

Impossible, for $\sin\theta$ is never greater than 1.

5) $\sin\theta = 0.8$ and $\csc\theta = -0.8$

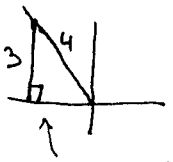
Impossible, for if $\sin\theta = 0.8 = \frac{4}{5}$ then $\csc\theta = \frac{1}{0.8} = \frac{5}{4} = 1.25$.

Find the value of the trigonometric function.

6) Find csc θ, given that $\sin\theta = -\frac{2}{3}$ and θ is in quadrant IV.

$$\csc\theta = \frac{1}{\sin\theta} = \boxed{-\frac{3}{2}}$$

7) Find tan θ, given that $\sin\theta = \frac{3}{4}$ and θ is in quadrant II.



$$x = -\sqrt{4^2-3^2} = -\sqrt{16-9} = -\sqrt{7}$$

$$\sin\theta = \frac{y}{r} = \frac{3}{4}$$

$$\tan\theta = \frac{y}{x} = \frac{3}{-\sqrt{7}} = \boxed{-\frac{3\sqrt{7}}{7}}$$

Without using a calculator, give the <u>exact</u> trigonometric function value.

8) tan 60°

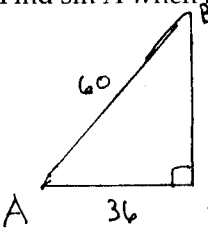
$$\tan 60^\circ = \frac{\sin 60^\circ}{\cos 60^\circ} = \frac{\sqrt{3}/2}{1/2} = \boxed{\sqrt{3}}$$

9) csc 45°

$$\csc 45^\circ = \frac{1}{\sin 45^\circ} = \frac{1}{\sqrt{2}/2} = \frac{2}{\sqrt{2}} = \boxed{\sqrt{2}}$$

Suppose ABC is a right triangle with sides of lengths a, b, and c and right angle at C. Find the unknown side length using the Pythagorean theorem and then find the value of the indicated trigonometric function of the given angle.

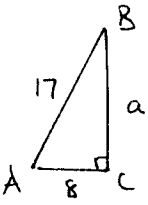
10) Find sin A when b = 36 and c = 60



$$a = \sqrt{60^2-36^2} = \sqrt{3600-1296} = \sqrt{2304} = \boxed{48}$$

$$\sin A = \frac{\text{opp}}{\text{hyp}} = \frac{48}{60} = \boxed{\frac{4}{5}}$$

11) Find csc A when b = 8 and c = 17

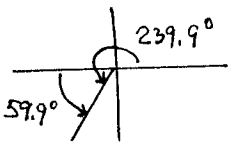


$a = \sqrt{17^2 - 8^2} = \sqrt{289 - 64} = \sqrt{225} = \boxed{15}$

$\csc A = \frac{1}{\sin A} = \frac{\text{hyp}}{\text{opp}} = \boxed{\frac{17}{15}}$

Find the reference angle for the given angle.

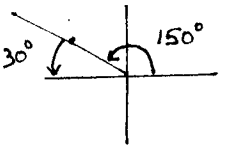
12) 239.9°



$239.9° - 180° = \boxed{59.9°}$

Give the exact value.

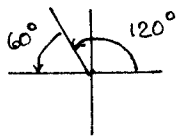
13) cos 150°



quadrant II, reference angle = $180° - 150° = 30°$

$\cos 150° = -\cos 30° = \boxed{-\frac{\sqrt{3}}{2}}$

14) tan 120°

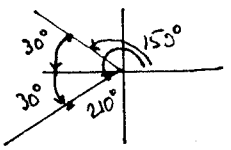


quadrant II, reference angle = $180° - 120° = 60°$

$\tan 120° = -\tan 60° = \boxed{-\sqrt{3}}$

Find all values of θ, if θ is in the interval [0, 360°) and has the given function value.

15) $\cos\theta = -\frac{\sqrt{3}}{2}$



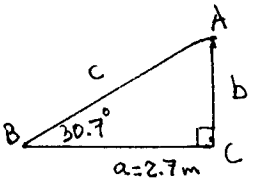
cosine is negative in Q. II and Q. III and the reference angle = 30° (because $\cos 30° = \frac{\sqrt{3}}{2}$)

$\therefore \quad \theta = 180° - 30° = \boxed{150°}$

or $\theta = 180° + 30° = \boxed{210°}$

Solve the right triangle.

16) a = 2.7 m, B = 30.7°, C = 90°



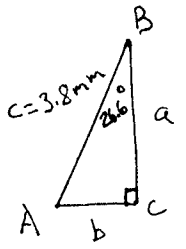
$\frac{b}{a} = \tan 30.7° \Rightarrow b = a\tan 30.7°$

$= (2.7)(.5938) = \boxed{1.6\text{ m}}$

$\frac{a}{c} = \cos 30.7° \Rightarrow c = \frac{a}{\cos 30.7°} = \frac{2.7}{.8600} = \boxed{3.14\text{ m}} \approx 3.1\text{ m}$

$A = 90° - 30.7° = \boxed{59.3°}$

17) B = 26.6°, c = 3.8 mm, C = 90°



$\sin 26.6^\circ = \frac{b}{c} \Rightarrow b = c \sin 26.6^\circ = (3.8)(.4478)$
$= \boxed{1.7 \text{ mm}}$

$\cos 26.6^\circ = \frac{a}{c} \Rightarrow a = c \cos 26.6^\circ = (3.8)(.8942)$
$= \boxed{3.4 \text{ mm}}$

$A = 90^\circ - 26.6^\circ = \boxed{63.4^\circ}$

Convert the degree measure to radians. Leave answer as a multiple of π.

18) 330°

$330 \text{ degrees} \cdot \frac{\pi \text{ radians}}{180 \text{ degrees}} = \frac{330\pi}{180} \text{ radians} = \boxed{\frac{11\pi}{6} \text{ radians}}$

Find the length of an arc intercepted by a central angle θ in a circle of radius r. Round your answer to 1 decimal place.

19) r = 31.3 ft; $\theta = \frac{\pi}{14}$ radians

$S = r\theta = (31.3 \text{ ft})\left(\frac{\pi}{14}\right) = \boxed{7.0 \text{ ft}}$

Find the exact circular function value.

20) $\sin \frac{-2\pi}{3}$

quadrant III, reference angle $= \frac{\pi}{3} = 60^\circ$

$\sin \frac{-2\pi}{3} = -\sin \frac{\pi}{3} = -\sin 60^\circ = \boxed{-\frac{\sqrt{3}}{2}}$