Mth 112 Outcomes for Exam 1 **NAME**

After studying, place a check mark next to those outcomes you feel you understand and/or are proficient with. Place a question mark next to those outcomes which you feel your skills/understanding is questionable. Turn in with your test.

To be successful on Exam 1 you should be able to …

Prerequisite Material

1. Solve a linear or quadratic equation algebraically.
2. Graph a function in a 'friendly' window (appropriate window).
3. Find the equation of a line from two points.
4. Find the equation of a line from a graph of the line.

Circles

1. Find the arc length or circumference of a circle from partial information.
2. Find the area or sector of a circle from partial information.
3. Switch among alternate rotational velocities (ω). e.g. rpm $\leftrightarrow$ rad/sec
4. Find linear velocities of a rotating object. e.g. velocity of rock ejected from rotating tire
5. Find rotational velocities in a combination of connected gears. (Indirect proportion)
6. Convert angles among various formats: $\pm\theta$ in radians, $\pm\theta$ in DMS, bearing, azimuth.
7. Use $\sin\theta$, $\cos\theta$, $\tan\theta$ to find coordinates on the unit circle ($r = 1$).
8. Use $\sin\theta$, $\cos\theta$, $\tan\theta$ to find coordinates on edge of circle when $r \neq 1$.

Triangles & Trigonometry

1. Apply the Pythagorean Theorem to find missing dimensions.
2. Apply similar triangles to find missing dimensions.
3. Apply $\sin\theta$, $\cos\theta$, $\tan\theta$ to find missing dimensions.
4. Apply $\sin^{-1} y/r$, $\cos^{-1} x/r$, $\tan^{-1} y/x$ to find missing angles.
5. Apply trigonometric relationships to simplify expressions. e.g. $\tan[\tan^{-1}(4 + x)] - 4$
6. Apply trigonometric relationships to generate new trig relationships. e.g. $\sin\theta = 4/5$, $\cos\theta = ?$
7. Apply inverse trig relationships to generate new trig relationships. e.g. $\sin^{-1} x = \theta$, $\cos\theta = ?$
8. Apply right triangle trigonometry to solve basic applications.

Functions

1. Use geometric relationships to find functional relationships. e.g. $A = \pi r^2$, $r = d/2 \rightarrow A(d) = (\frac{1}{4})\,\pi\, d^2$
2. Rewrite an implicit function in explicit form. i.e. $F(x,y) = 0 \rightarrow y = f(x)$.
3. Use function notation. e.g. $f(2)$, $f(a + b)$

Some Sample Problems

1) Find the equation of the line through (14, -19) & (26, 15) in slope-intercept form.

2) Solve for x: $\frac{2x-4}{3} + 5 = 12 - \frac{5x-7}{2}$

3) Solve for y: $\frac{4x+5y}{2} = 4 - \frac{y}{3}$

Problems 4-8 refer to fig 1

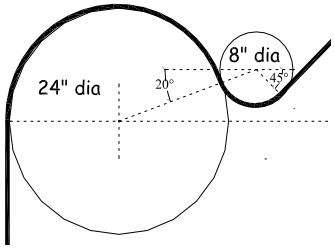


fig 1

4) What is the length of belt contact on the two rollers?

5) The 24" drum turns at 200 rpm. What is the 8" drum's rpm?

6) What is the rotational velocity in radians/sec of each drum?

7) How fast is the belt moving (ft/sec)?

8) How fast (rpm) must the larger drum rotate so that the belt moves at 500 ft/min?

9) A garage door opener uses a 6" pulley to wrap the cable. If the pulley turns at 25 rpm, how fast does the door rise?

10) How many degrees are there between the two hands of the clock at 9:25? (give the smaller angle)

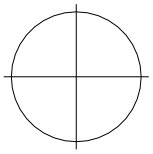
11) A ratchet turns a bolt 48° 50' 30" with each pull. How many pulls will turn the bolt (a) 20 revolutions, (b) 25π rad?

12) Road speed = 60 mph. Tire diameter = 42" (a) What is the tire's rpm? _____ (b) What is the tire's rad/sec?_____

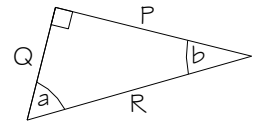
13) Convert θ = 135° to its equivalent (a) + radian angle _____, (b) − deg angle_____ ,

(c) azimuth _____

(d) Mark -960° on the circle, (e) now rotate +4240° and mark the new position.



14) Use the diagram to answer (a) − (f)

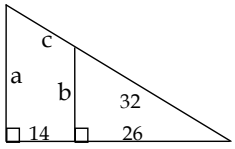


(a) tan a = (b) sin a = (c) cos b =

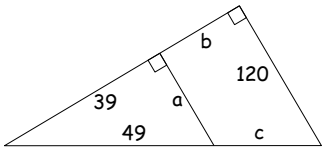
(d) $\sin^{-1}(Q/R)$ = (e) invtan (P/Q) = (f) $\sin^{-1}(\sin a)$ =

15) Answer must be simplified: (a) sin a = k/j; cos a = ? (b) sin x = y; x = ? (c) sin x = y; cos x = ?

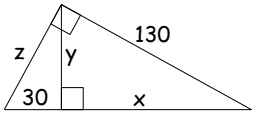
16) Find a, b & c



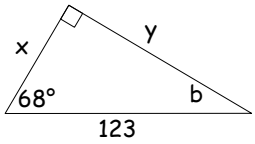
17) Find a, b & c



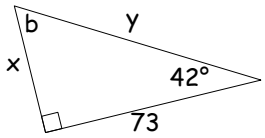
18) Find x, y, z



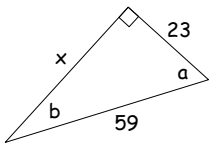
19) Find x, y, b



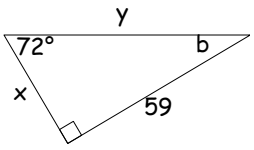
20) Find x, y, b



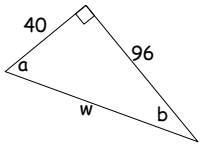
21) Find x, a, b



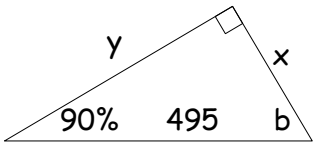
22) Find x, y, b



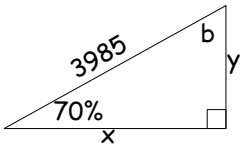
23) Find a, b, w



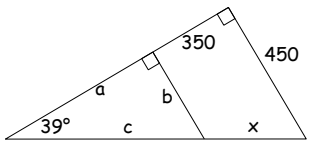
24) Find x, y b°



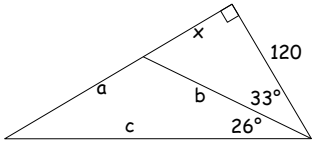
25) Find x, y, b°



26) Find a, b, c, x



27) Find a, b, c, x



28) Give the area of a circle as a function of its circumference.

Answers (unchecked)

1) $y = 17x/6 - 176/3$
2) $x = 71/19$
3) $y = (2y - 12x)/17$
4) $119\pi/9$ in
5) 600 rpm
6) (a) large drum: $20\pi/3$ rad/sec; (b) small drum: 20π rad/sec
7) $20\pi/3$ ft/sec
8) $250/\pi$ rpm
9) 2.5π in/sec
10) 132.5°
11) (a) 147.4 rev → 148 rev; (b) 92.1 rev → 93 rev.
12) (a) 480.19 rpm; (b) ~50.29 rad/sec
13) (a) $3\pi/4$; (b) -225°; (c) 315° azi; (d) = +120°; (e) = +40°
14) (a) tan a = P/Q; (b) sin a = P/R; (c) cos b = P/R; (d) $\sin^{-1}(Q/R) = b$; (e) invtan (P/Q) = a; (f) $\sin^{-1}(\sin a) = a$
15) (a) $\cos a = (\sqrt{j^2 - k^2})/j$; (b) x = invsin y; (c) $\cos x = \sqrt{1 - y^2}$
16) a = 28.70; b = 18.65; c = 17.23
17) a = 29.66; b = 118.76; c = 149.21
18) x = 115.86; y = 58.96; z = 66.15
19) x = 46.08; y = 114.04; b = 22°
20) x = 65.73; y = 98.23; b = 48°
21) x = 54.33; a = 67.06°; b = 22.94°
22) x = 19.17; y = 62.04; b = 18°
23) a = 67.38°; b = 22.62°; w = 104
24) 90% = 41.99°; x = 331.14; y = 367.93; b = 48.01°
25) 70% = 34.99°; x = 3264.64; y = 2285.25; b = 55.01°
26) a = 205.70; b = 166.57; c = 264.69; x = 450.36
27) a = 121.78; b = 143.08; c = 232.99; x = 77.93
28) $A(c) = c^2/(4\pi)$