Midterm 1, Fundamentals, (90 minutes) 2021.11.15

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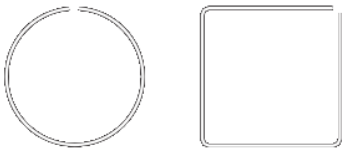
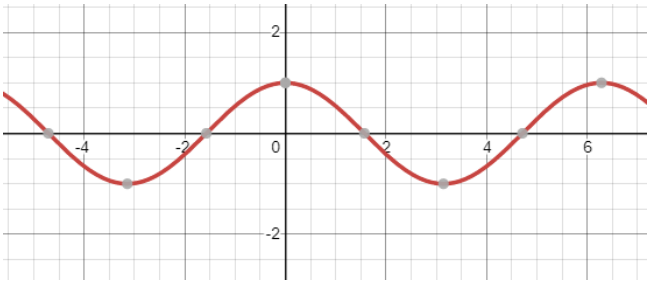
1. a) Solve an inequality. $\frac{2}{x-3} < \frac{1}{x+2}$
   b) Graph your solution in the real line. (3+1 points)
2. a) Solve a quadratic equation in real numbers. $x^2 + 3x + 4 = 0$
   b) If there is no real solution please write solutions in complex numbers. (2+2 points)
3. A wire 360 in. long is cut into two pieces. One piece is formed into a square, and the other is formed into a circle. If the two figures have the same area, what are the lengths of the two pieces of wire (to the nearest tenth of an inch)?



(3points)

4. Given a graph of cos x.
   a) Please sketch a graph of $y = 2\cos(x + \pi)$ comparing with the given figure.
   b) Please write how transformed your figure from original given figure.



(2+2 points)

5. Find the exact value of the expression.
   $\sin(\tan^{-1} 1)$ (2 point)
6. Points A and B are separated by a lake. To find the distance between them, a surveyor locates a point C on land such that $\angle CAB = 54^0$. He also measures CA as 412 ft and CB as 537 ft.
   a) Please sketch the figure of the problem.
   b) Find the distance between A and B. (1+2 points)
7. Simplify and find a value of the expression.
   a) $If\ p = \frac{1}{2\log_7 2},\ find\ 4^p.$
   b) $25^{\log_{125} 8}$ (2+2 points)

Score table:

I	II	III	IV	V	VI	VII	SUM
4	4	3	4	2	3	4	24