*University of Connecticut*
*Department of Mathematics*

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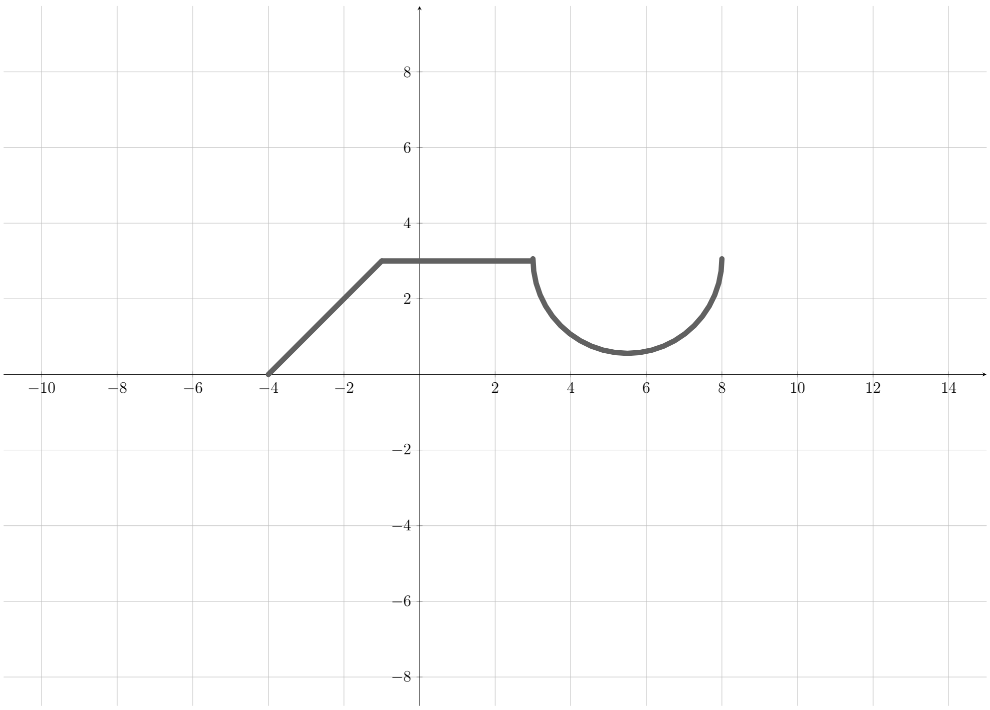
# Math 1060Q Final Exam Practice Questions Sp 2020

- This set of questions is provided to help you practice for the paper and pencil portion of the final exam. It is meant to give you an idea of the type of questions and topics covered on the exam. You should NOT expect the questions on the actual exam to be exactly the same or small variations on these.
- Be sure to review the WebAssign Practice Exams as well.
- You will be provided with numerical solutions to each problem. You may ask about these questions during office hours.

Selected answers are given in the following pages. It is recommended that you try the problems first on your own and then compare your own answers with these.

1. Let $f(x) = x^2 - 2$ when $0 \leq x \leq 2$. Explain why $f$ has an inverse on this domain. Then find the inverse of $f$ and the domain and range of $f$ and its inverse.

2. A graph of $f(x)$ is given below. Describe the transformations needed to obtain the graph of $g(x) = -f(x-2) + 7$ then sketch a graph of $g(x)$ on the same axis. Create a table of values to help you.




3. For the functions below, find their domain, end behavior (including at horizontal asymptotes), any vertical asymptotes, and zeros. Use these to sketch a graph of the function.

   (a) $g(x) = -x^5 + 4x$

   (b) $f(x) = \dfrac{x+2}{x^2 - 3x + 2}$

   (c) $\sec(3x) - 1$

4. Solve for $x$ in each of the following

   (a) $\ln(x-1) + \ln(x-2) = 6$

   (b) $2\sqrt{3}\csc(x) + 4 = 0$

   (c) $4(e^{3x}) - 1 = 5$

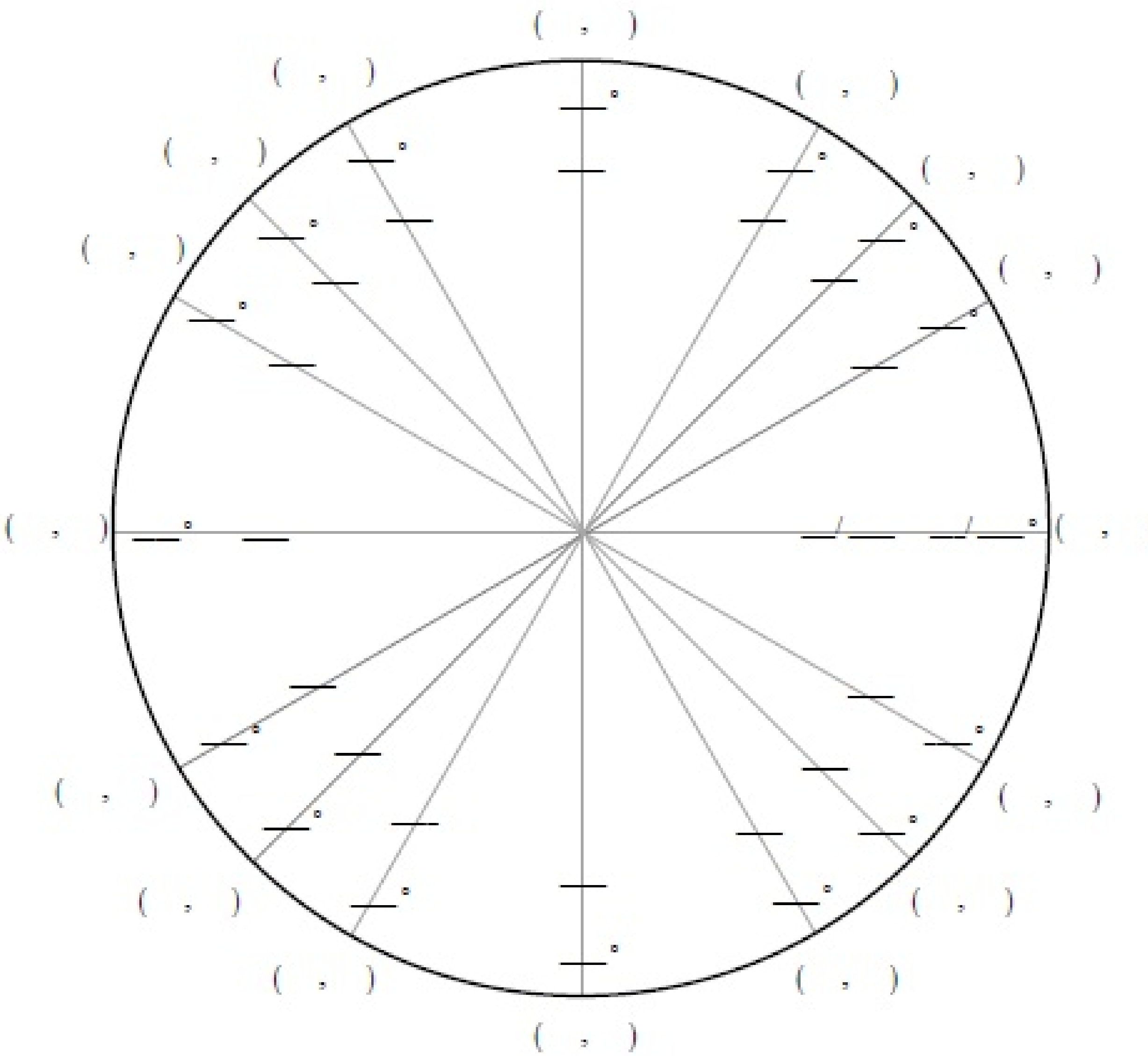
   (d) $\cos x + \sin x \tan x = 2$

5. The amount of money $A$ in an account which earns interest compounded continuously can be modeled by $A = Pe^{rt}$ where $t$ is in years. At $t = 0$, there is \$100 in the account. At $t = 4$ there is \$150. Find the amount of money when $t = 10$.

6. If $\tan(\theta) = 4$ what are the possible values for the other trig functions? Explain your reasoning.

7. Sketch a graph of at least two periods of $f(x) = 2\sin(3x) + 1$. State the period, amplitude, any other transformations applied to the parent graph and the zeros.

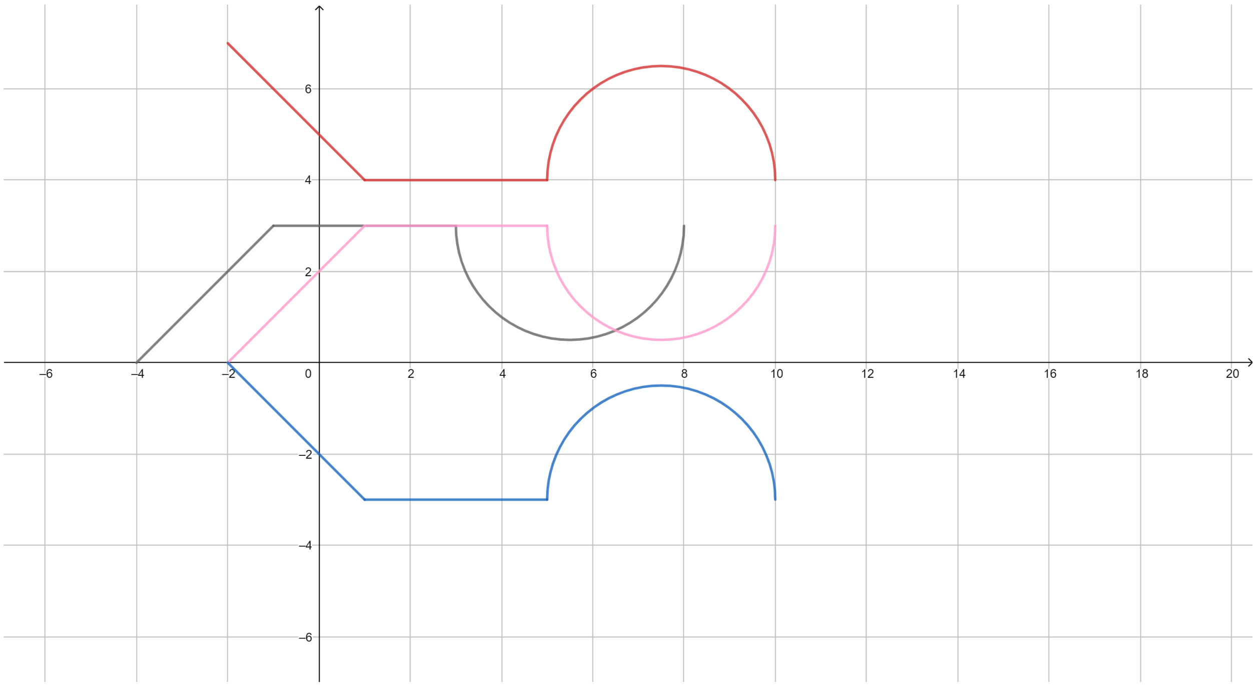
8. Fill out the blank unit circle on the next page.



These answers are provided for you to check your work. The amount of work provided below is NOT sufficient to receive full credit on the exam.

1. $f^{-1}(x) = \sqrt{x+2}$ $f$ has domain $[0, 2]$ and range $[-2, 2]$. $g$ has domain $[-2, 2]$ and range $[0, 2]$.

2. Drawn in stages. Original: gray. $f(x-2)$: pink. $-f(x-2)$: blue. $-f(x-2)+7$: red.




3. Properties are provided below. You need to have a graph as well.

| function | domain | end behavior | HA | VA | zeros |
|---|---|---|---|---|---|
| $g(x) = -x^5 + 4x$ | $(-\infty, \infty)$ | $g(x) \to \infty$ as $x \to -\infty$ <br> $g(x) \to -\infty$ as $x \to \infty$ | none | none | $x = 0, -2, 2$ |
| $f(x) = \dfrac{x+2}{x^2 - 3x + 2}$ | $x \neq 1, 2$ | $f(x) \to 0$ as $x \to \pm\infty$ | $y = 0$ | $x = 1,\ x = 2$ | $x = -2$ |
| $h(x) = sec(3x) - 1$ <br> Note: $k$ is any integer | $x \neq \dfrac{(2k+1)\pi}{6}$ | oscillates between <br> $-\infty$ and $\infty$ | none | $x = \dfrac{(2k+1)\pi}{6}$ | $x = \dfrac{k\pi}{3}$ |

4. (a) $x = \dfrac{3 + \sqrt{9 - 4(2 - e^6)}}{2}$

   (b) $x = \dfrac{4\pi}{3} + 2\pi k$ and $x = \dfrac{5\pi}{3} + 2\pi k$ where $k$ is any integer

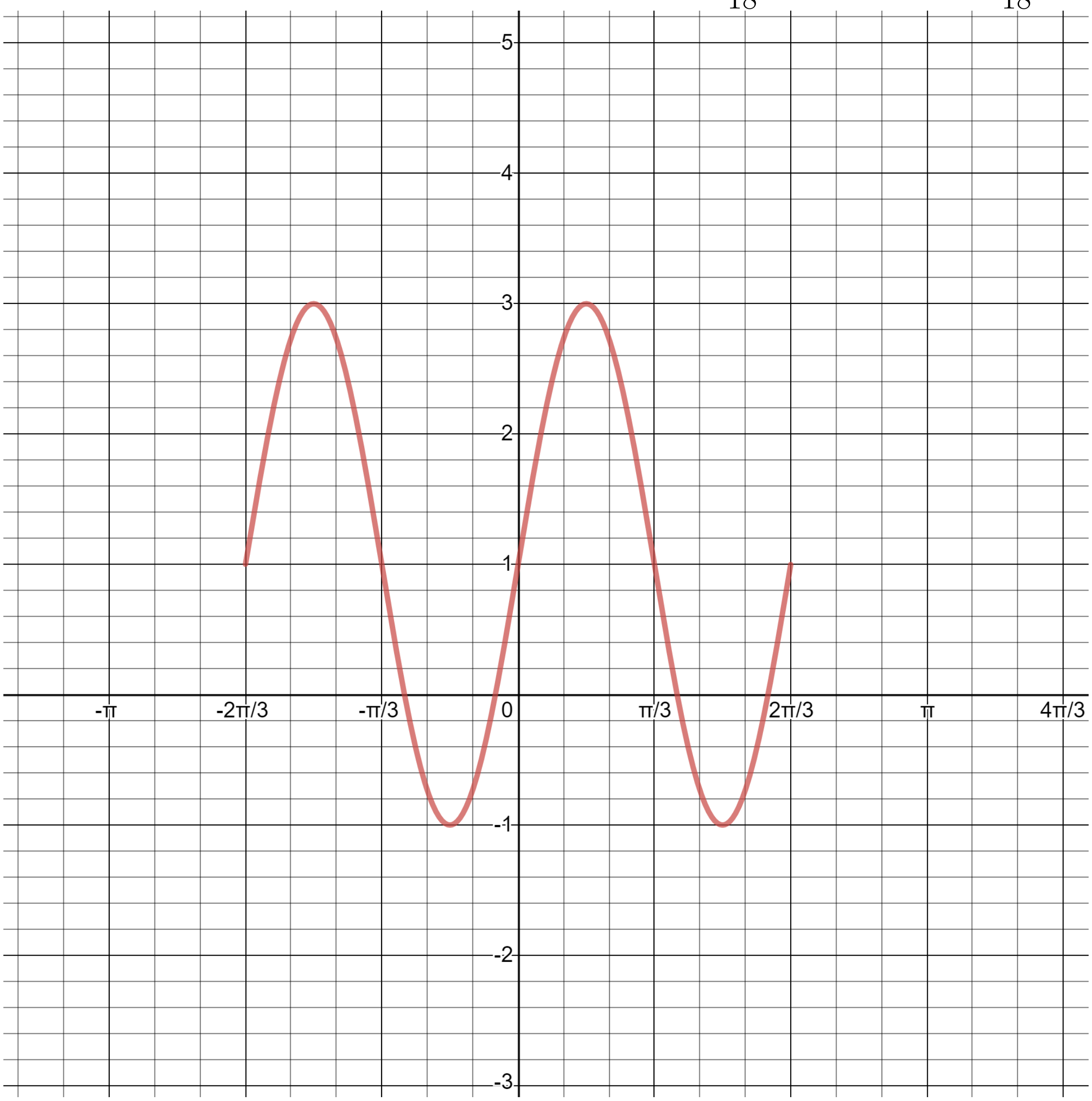
   (c) $x = \dfrac{\ln(3/2)}{3}$

   (d) $x = \dfrac{\pi}{3} + 2\pi k$ and $x = \dfrac{5\pi}{3} + 2\pi k$ where $k$ is any integer

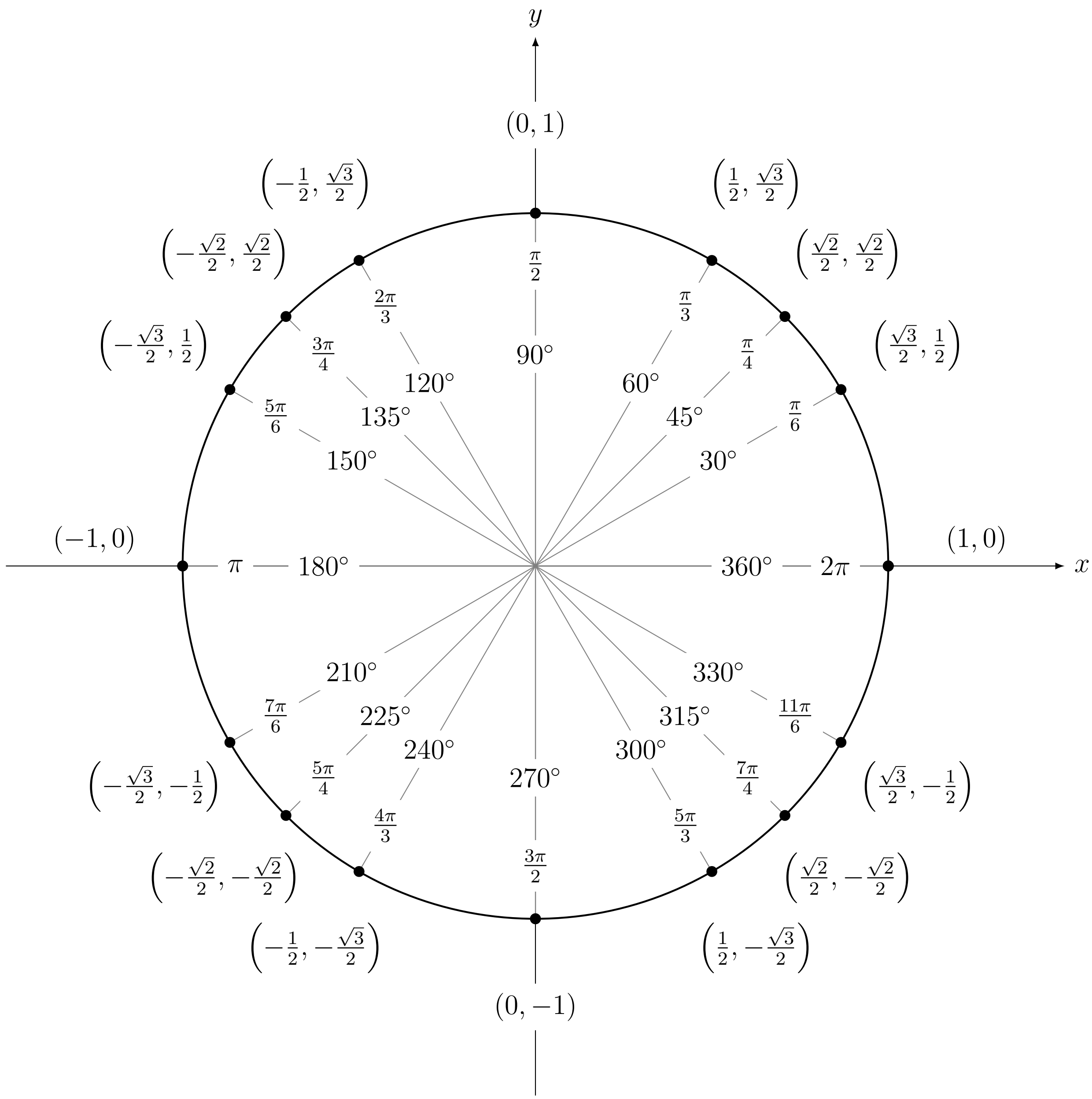
5.
$$A = 100e^{\frac{\ln(1.5)}{2}5} = 100 \cdot 1.5^{\frac{5}{2}} \approx \$275.57$$

6. $\cos(\theta) = \pm\frac{1}{\sqrt{17}}, \sin(\theta) = \pm\frac{4}{\sqrt{17}}, \sec(\theta) = \pm\sqrt{17}, \csc(\theta) = \pm\frac{\sqrt{17}}{4}, \cot(\theta) = 1/4$. Note $\cos(\theta), \sin(\theta), \csc(\theta)$ and $\sec(\theta)$ will all have the same sign.

7. period $2\pi/3$, amplitude: 2, shift up 1. Zeros at $x = \dfrac{7\pi}{18} + 2\pi k$ and $x = \dfrac{11\pi}{18} + 2\pi k$




8. See next page.


y
x
(0, 1)
(−1, 0)
(1, 0)
(0, −1)
(1/2, √3/2)
(√2/2, √2/2)
(√3/2, 1/2)
(−1/2, √3/2)
(−√2/2, √2/2)
(−√3/2, 1/2)
(−√3/2, −1/2)
(−√2/2, −√2/2)
(−1/2, −√3/2)
(1/2, −√3/2)
(√2/2, −√2/2)
(√3/2, −1/2)
π/2
90°
π/3
60°
π/4
45°
π/6
30°
2π/3
120°
3π/4
135°
5π/6
150°
π
180°
360°
2π
7π/6
210°
5π/4
225°
4π/3
240°
3π/2
270°
5π/3
300°
7π/4
315°
11π/6
330°