Math 251 Fall 2017   **Quiz #1.5, September 6**

Name: _____

There are 25 points possible on this quiz. This is a closed book quiz, but you are allowed to use a calculator and a ruler. **Please show all of your work!** If you have any questions, please raise your hand.

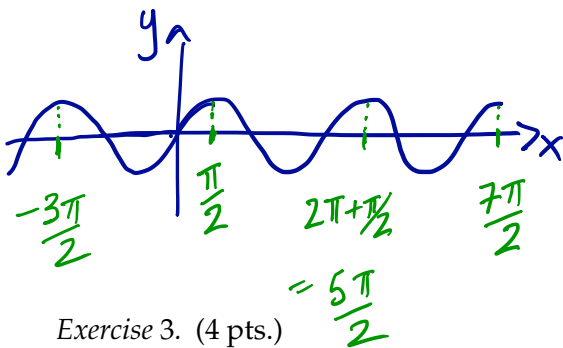*Exercise 1.* (3 pts.) Find a formula for the inverse of the function $h(x) = \ln(2 - 5x)$.

- Switch x and y.
  $$x = \ln(2 - 5y)$$
- Solve for y.
  $$e^x = 2 - 5y$$

$$5y = 2 - e^x$$
$$y = \frac{1}{5}(2 - e^x)$$

answer: $h^{-1}(x) = \frac{1}{5}\left(2 - e^x\right)$

Exercise 2. (3 pts.) Solve $\sin x = 1$.

$-\frac{3\pi}{2}$ $\frac{\pi}{2}$ $2\pi + \frac{\pi}{2}$ $\frac{7\pi}{2}$
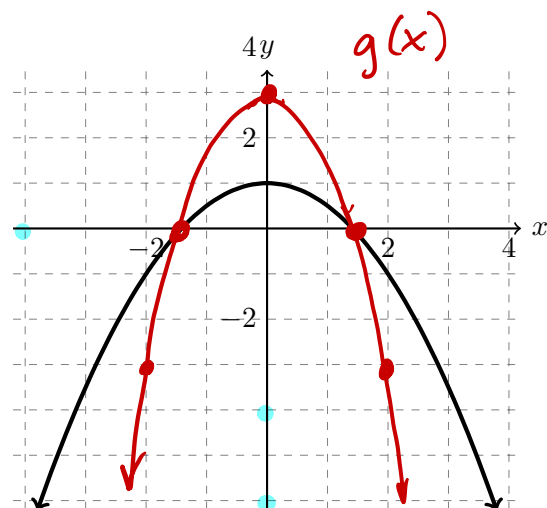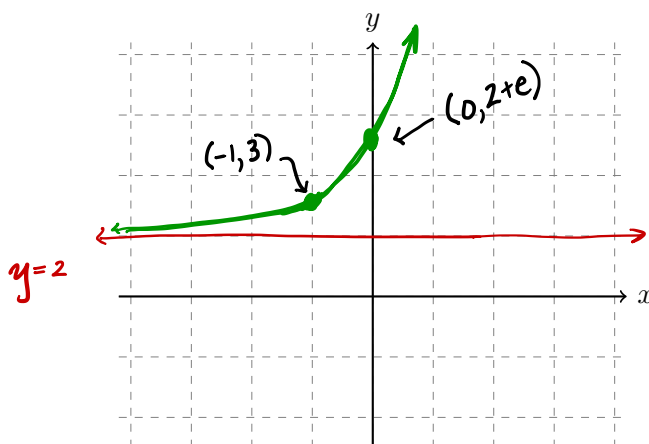
$= \frac{5\pi}{2}$

answer:

$$x = \ldots -\frac{3\pi}{2}, \frac{\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}, \ldots$$

or

$$x = 2\pi k + \frac{\pi}{2} \quad \text{for any integer } k.$$

Exercise 3. (4 pts.)

1. Graph $h(x) = 2 + e^{x+1}$ on the grid given below. You must clearly label any asymptotes and explicitly label two points on your sketch.

$(-1, 3)$ $(0, 2+e)$

$y = 2$

2. The graph of the function $f(x)$ is given below. Draw on the same axes the function $g(x) = 3f(x)$.

$g(x)$

UAF Calculus 1   1   v-3


_____ / 25

Exercise 4. (6 pts.) Determine whether the following statements are true or false. Circle T or F.

a) $(e^{5x})^2 = e^{25x^2}$ [annotation: e^{10x}]

T or **F**

c) $(a+b)^2 = a^2 + 2ab + b^2$

T or F

e) $\ln(ex) = 1 + \ln x$

T or F

b) $\sqrt{x^2 + y^2} = x + y$ [annotation: plug in $x=y=1$]

T or **F**

d) $\dfrac{x^8}{x^{-3}} = x^5$

T or **F**

f) $\tan^{-1} x = \frac{1}{\tan x} = (\tan x)^{-1}$ [annotation: arctan x]

T or **F**

Exercise 5. (3 pts.) Find the domain of the function $f(x) = \frac{\sqrt{x-1}}{9-x^2}$. Give your answer in interval notation.

Work: We need
① $x - 1 \geq 0$ or $\boxed{x \geq 1}$
and
② $9 - x^2 \neq 0$ or $\boxed{\text{avoid } x = \pm 3}$

picture
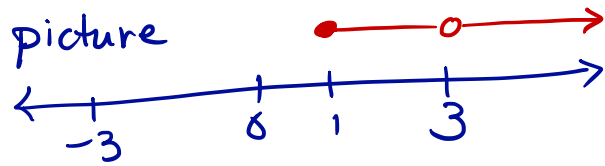
answer: The domain of f(x) is
$[1, 3) \cup (3, \infty)$

Exercise 6. (3 pts.) Expand the following logarithm: $\ln\left(\dfrac{\sqrt{x^2+4}}{2x}\right)$

$\ln\left(\dfrac{(x^2+4)^{1/2}}{2x}\right) = \ln(x^2+4)^{1/2} - \ln(2x)$

$= \boxed{\frac{1}{2}\ln(x^2+4) - \ln 2 - \ln x}$ [annotation: can't be factored]

Exercise 7. (3 pts.) Find an equation of the line through the points $(2, +3)$ and $(7, 1)$. State the slope and the y-intercept.   [annotation: x y x y]

$m = \frac{\Delta y}{\Delta x} = \frac{+3-1}{2-7} = \frac{2}{-5} = \boxed{\frac{-2}{5} = m}$ slope

line
$y - 1 = \frac{-2}{5}(x-7)$

$y = -\frac{2}{5}x + \frac{14}{5} + 1$

$\boxed{y = -\frac{2}{5}x + \frac{19}{5}}$ equation

$\boxed{b = \frac{19}{5}}$ intercept

observe that all parts of the problem are clearly answered.

UAF Calculus 1   2   v-3