

Math 251 Fall 2017

Quiz #1.5, September 6

Name: Solutions

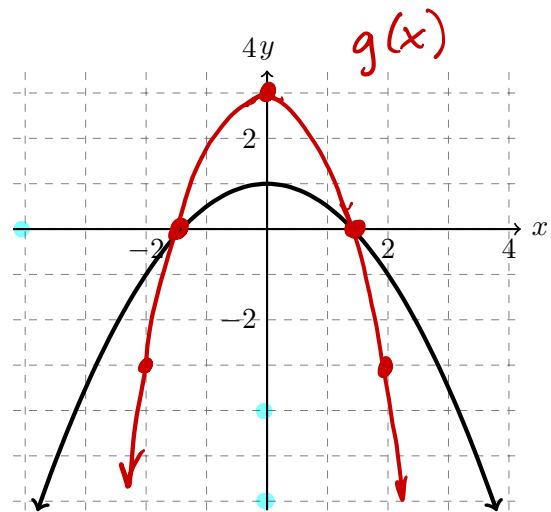
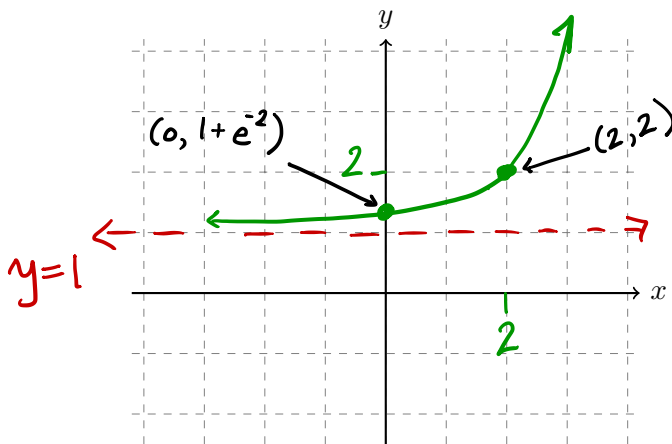
There are 25 points possible on this quiz. This is a closed book quiz, but you are allowed to use a calculator and a ruler. **Please show all of your work!** If you have any questions, please raise your hand.

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

Exercise 2. (4 pts.)

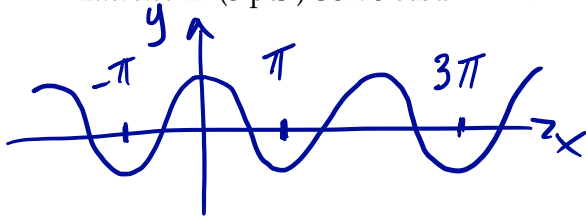
1. Graph $h(x) = 1 + e^{x-2}$ on the grid given below. You must clearly label any asymptotes and explicitly label two points on your sketch.
2. The graph of the function $f(x)$ is given below. Draw on the same axes the function $g(x) = 3f(x)$.



Exercise 3. (6 pts.) Determine whether the following statements are true or false. Circle T or F.

- | | | |
|---|---|--|
| a) $(e^{5x})^2 = e^{25x^2}$
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) $\sqrt{x^2 + y^2} = x + y$
T or F (plug in $x=y=1$) | d) $\frac{x^8}{x^{-3}} = x^5$
T or F | f) $\tan^{-1} x = \frac{1}{\tan x} = (\tan x)^{-1}$
arctan x
T or F |

Exercise 4. (3 pts.) Solve $\cos x = -1$.



answer:

$$x = \dots -\pi, \pi, 3\pi, 5\pi, \dots$$

or

$$x = (2k+1)\pi$$

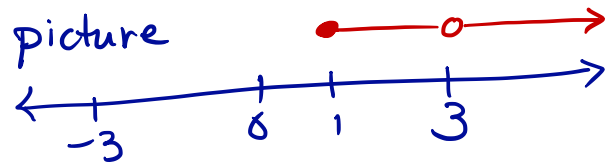
Exercise 5. (3 pts.) Find the domain of the function $f(x) = \frac{\sqrt{x-1}}{9-x^2}$. Give your answer in interval notation.

Work: We need

$$\textcircled{1} x-1 \geq 0 \text{ or } \boxed{x \geq 1}$$

and

$$\textcircled{2} 9-x^2 \neq 0 \text{ or } \boxed{\text{avoid } x = \pm 3}$$



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

Exercise 6. (3 pts.) Expand the following logarithm: $\ln\left(\frac{\sqrt[4]{5+x^2}}{\sqrt{1-x}}\right)$

$$\ln\left(\frac{\sqrt[4]{5+x^2}}{\sqrt{1-x}}\right) = \ln(5+x^2)^{1/4} - \ln(1-x)^{1/2}$$

$$= \boxed{\frac{1}{4} \ln(5+x^2) - \frac{1}{2} \ln(1-x)}$$

This doesn't factor.

Exercise 7. (3 pts.) Find an equation of the line through the points $(3, -2)$ and $(8, 1)$. State the slope and the y -intercept.

$$m = \frac{\Delta y}{\Delta x} = \frac{-2-1}{3-8} = \frac{-3}{-5} = \frac{3}{5} = m \text{ slope}$$

equation of line:

$$y-1 = \frac{3}{5}(x-8)$$

$$y = \frac{3}{5}x - \frac{24}{5} + 1$$

$$\boxed{y = \frac{3}{5}x - \frac{19}{5}}$$

equation of line

$$\boxed{b = \frac{-19}{5}} \text{ y-intercept}$$

observe that all parts of the problem are clearly answered.