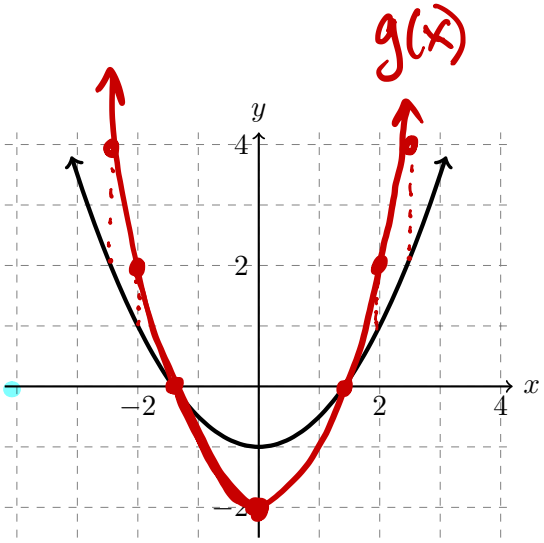
Math 251 Fall 2017 **Quiz #1.5, September 6**

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.

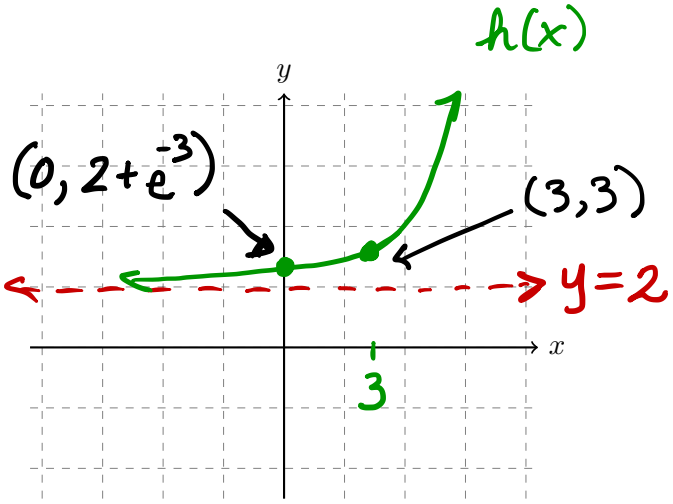
Exercise 1. (4 pts.)

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



2. Graph $h(x) = 2 + e^{x-3}$ on the grid given below. You must clearly label any asymptotes and explicitly label two points on your sketch.

up 2 units
right 3 units



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

Switch x and y:

$x = \ln(3y - 1)$

Solve for y:

$e^x = 3y - 1$

$3y = e^x + 1$

$y = \frac{1}{3}(e^x + 1)$

answer:

$h^{-1}(x) = \frac{1}{3}(e^x + 1)$

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

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

T or F

b) $(e^{4x})^2 = e^{16x^2}$

T or F

$= e^{8x}$

c) $\sqrt{x^2 + y^2} = x + y$

T or F

just check this with $x = y = 1$.

d) $\frac{x^7}{x^{-2}} = x^9$

T or F

e) $\sin^{-1} x = \frac{1}{\sin x} = (\sin x)^{-1}$

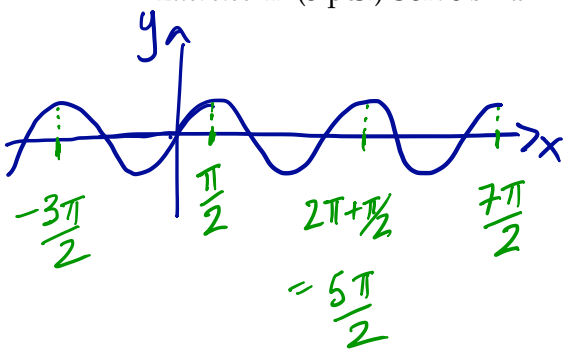
arcsin x

T or F

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

T or F

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



answer:

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

or

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

Exercise 5. (3 pts.) Find the domain of the function $f(x) = \frac{\sqrt{1-x}}{4-x^2}$. Give your answer in interval notation.

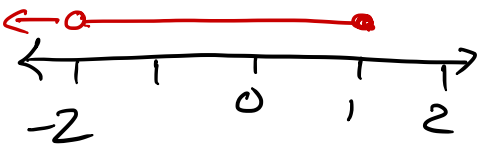
Work: We need

① $1-x \geq 0$ or $x \leq 1$

and

② $4-x^2 \neq 0$ or avoid $x = \pm 2$

picture



answer: The domain of $f(x)$ is $(-\infty, -2) \cup (-2, 1]$

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

$\ln \frac{\sqrt[3]{5+x}}{\sqrt{1-x^2}} = \ln (5+x)^{1/3} - \ln (1-x^2)^{1/2} = \frac{1}{3}\ln(5+x) - \frac{1}{2}\ln(1-x^2)$

$1-x^2 = (1-x)(1+x)$

answer

$= \frac{1}{3}\ln(5+x) - \frac{1}{2}\ln(1-x) - \frac{1}{2}\ln(1+x)$

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.

(x y) (x y)

$m = \frac{\Delta y}{\Delta x} = \frac{-2-1}{-3-8} = \frac{-3}{-11} = \frac{3}{11} = m$ slope

line:

$y - 1 = \frac{3}{11}(x-8)$

$y = \frac{3}{11}x - \frac{24}{11} + 1$

$y = \frac{3}{11}x - \frac{13}{11}$ equation of line

$b = \frac{-13}{11}$ y-intercept

Observe that each part of problem is clearly answered.