MATH F251 Calculus I **Quiz 1** **Fall 2020**

Name (printed legibly): Solutions

Directions: The quiz contains 20 problems, and each problem is worth one point. Place your answer in the blank provided to the right. For graphing questions, a set of axes are provided. **Calculators are not allowed.**

For this quiz only, no partial credit will be given.

1. Evaluate $8^{-2/3}$. You should have no exponents in your final answer.

$8^{-2/3} = \frac{1}{8^{2/3}} = \frac{1}{(8^{1/3})^2} = \frac{1}{2^2} = \frac{1}{4}$

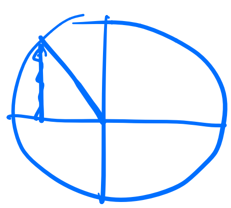
Answer: $1/4$

2. Find the exact value of $\log_{10}\left(\frac{1}{10000}\right)$.

$\frac{1}{10000} = 10^{-4}$ so $\log_{10}(10^{-4}) = -4$

Answer: -4

3. Find the exact value of $\cancel{\cos(2\pi/3)}$. $\sin\left(\frac{3\pi}{4}\right)$



Answer: $\frac{1}{\sqrt{2}}$

4. Simplify the expression $\left(\frac{3xy}{x^4y^{7/2}}\right)^2$. Write your answer without negative exponents.

$\left(\frac{3xy}{x^4y^{7/2}}\right)^2 = \frac{9x^2y^2}{x^8y^7}$

$= 9x^{-6}y^{-5} = \frac{9}{x^6y^5}$

Answer: $\frac{9}{x^6y^5}$

5. Write an equation in slope-intercept form (that is, in the form $y = mx + b$) for the line that passes through the points $(-2,7)$ and $(3,-9)$.

slope $= \frac{-9-7}{3-(-2)} = \frac{-16}{5}$

$y = \frac{-16}{5}(x+2) + 7 = \frac{-16}{5}x - \frac{32}{5} + \frac{35}{5} = \frac{-16}{5}x + 3/5$

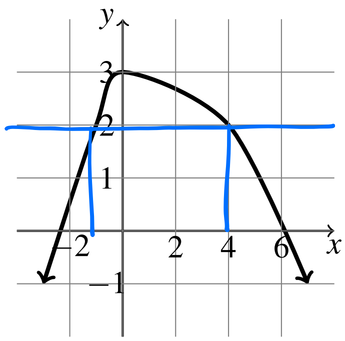
Answer: $y = \frac{-16}{5}x + 3/5$

6. Expand and simplify $(4x+2)^2 - 8(x-1)$.

$$(4x+2)^2 - 8(x-1) = 16x^2 + 16x + 4 - 8x + 8$$
$$= 16x^2 + 8x + 12$$

$16x^2 + 8x + 12$

7. Use the graph of $f(x)$ below to estimate the value(s) of x such that $f(x) = 2$.



$x = 4, \; x = -1$

8. For the function $f(x) = \frac{\overset{5}{2}}{x}$, find the expression $f(12+h) - f(12)$. Simplify your answer and write your answer as a single fraction.

$$f(12+h) - f(12) = \frac{5}{12+h} - \frac{5}{12}$$
$$= \frac{5(12) - 5(12+h)}{(12+h)(12)} = \frac{60 - 60 - 5h}{144 + 12h} = \frac{-5h}{144 + 12h}$$

$\frac{-5h}{144+12h}$

9. Given the piecewise defined function below, determine the value(s) of x such that $f(x) = -27$.

$$f(x) = \begin{cases} 2x-5 & x < 0 \\ x^3 & x \geq 0 \end{cases}.$$

Note $x^3 \geq 0$ when $x \geq 0$ so the only solution is in the $2x-5$ branch.

So $2x - 5 = -27 \Rightarrow 2x = -27 + 5 = -22 \Rightarrow x = -11$

$x = -11$

10. Solve for x in the equation $x^2 - 2x = 8$.

$x = 4$ or $x = -2$

$$x^2 - 2x - 8 = 0 \Rightarrow$$
$$(x-4)(x+2) = 0$$
$$x = 4 \text{ or } x = -2$$

11. Solve for x exactly in the equation $e^{2-5x} = \frac{1}{3}$.

$e^{2-5x} = \frac{1}{3}$

$2 - 5x = \ln(1/3) \Rightarrow -5x = \ln(1/3) - 2$

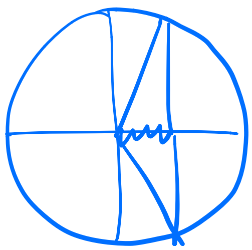
$\Rightarrow x = \frac{-1}{5}(\ln(1/3) - 2)$

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

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

$= 2/5 + \frac{\ln(3)}{5}$

12. Find all solutions to the equation $2\cos(\theta) = 1$ in the interval $[0, 2\pi]$.



$\theta = \frac{\pi}{3}$ or $\theta = \frac{5\pi}{3}$

13. A table of values for the function $f(x)$ is given below. Use the table to determine $f^{-1}(5)$.

x	-5	0	5	10	15	20	25	30	35
$f(x)$	40	33	18	10	-4	6	5	-2	-1/2

$f(25) = 5 \Rightarrow f^{-1}(5) = 25$

$f^{-1}(5) = 25$

14. Solve the inequality $9 - x^2 \leq 0$. Give your answer in interval notation.

$(3 - x)(3 + x) \leq 0 \Rightarrow$

$3 - x \leq 0 \Rightarrow 3 \geq x$ or $3 + x \leq 0 \Rightarrow x \leq -3$

$(-\infty, -3] \cup [3, \infty)$

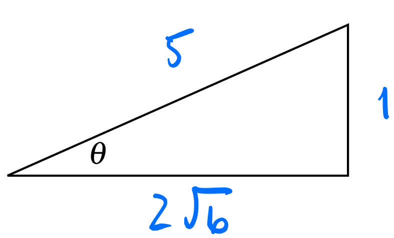
15. Determine the domain of $f(x) = \ln(x - 4)$. Give your answer in interval notation.

$\ln(*)$ has domain $(0, \infty)$

So $\ln(x-4)$ has domain $(4, \infty)$

$(4, \infty)$

16. In the triangle below, $\sin\theta = \frac{1}{5}$. Determine $\cos\theta$.



$\sqrt{5^2 - 1^2} =$

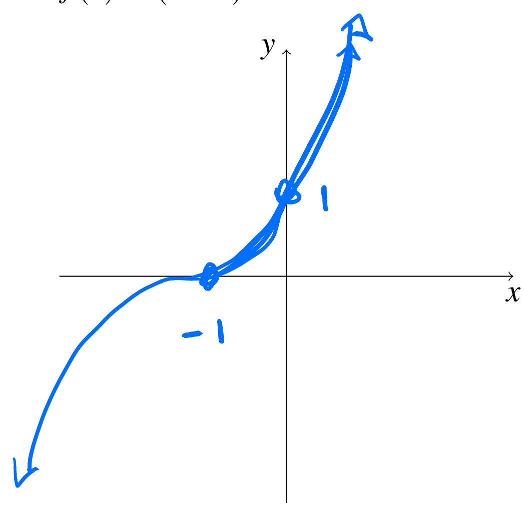
$\sqrt{24} = 2\sqrt{6}$

$\cos\theta = \frac{2\sqrt{6}}{5}$

Sketch graphs of the following functions. Label the x- and y-intercepts, if they exist. Draw in any asymptotes using dashed lines, and write the equation of the asymptote, if it exists.

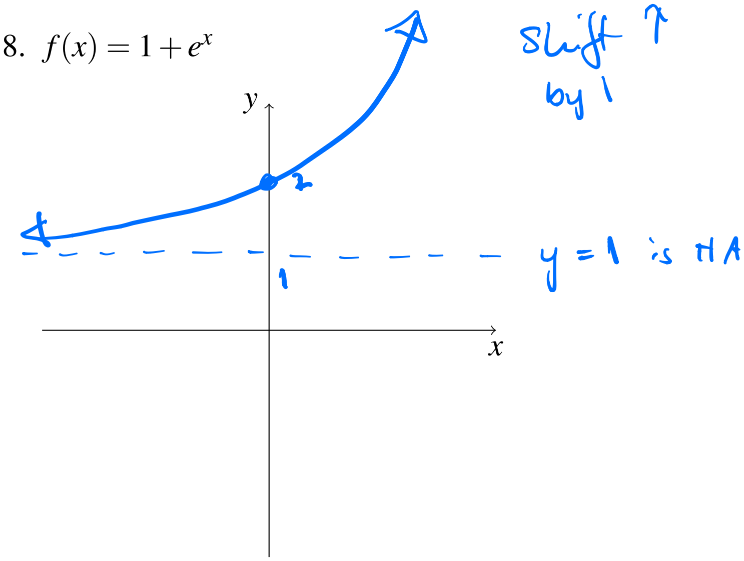
17. $f(x) = (x+1)^3$

shift ← by 1

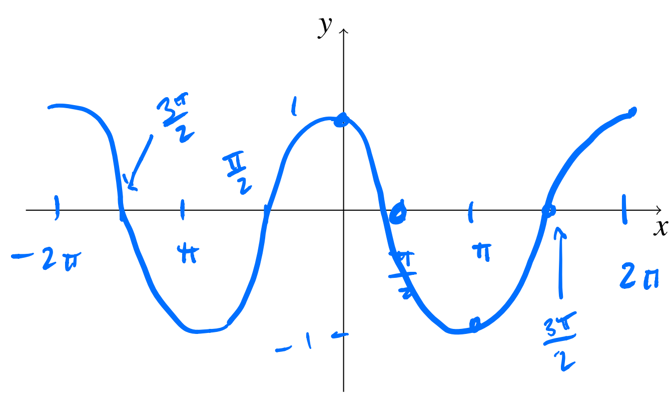


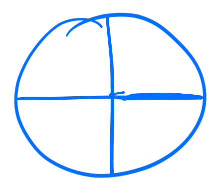
18. $f(x) = 1 + e^x$

shift ↑ by 1



19. $y = \cos(x)$ on the interval $[-2\pi, 2\pi]$





20. Given the graph of $f(x)$ below, draw the graph of $-2f(x)$. flip ↕ & scale by 2