Solutions

Directions: The quiz contains 20 problems. Place your answer in the blank provided. For graphing questions, a set of axes are provided. All graphs must be labeled.

1. Simplify $16^{-\frac{3}{4}}$.

$$(16)^{-3/4} = \frac{1}{(\sqrt[4]{16})^3} = \frac{1}{8}$$

Answer: $1/8$

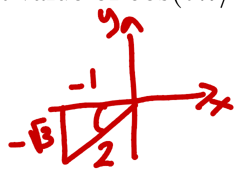
2. Simplify $\log_{10} 0.001$.

$$\log_{10} 10^{-3} = -3$$

Answer: -3

3. Find the exact value of $\cos(7\pi/6)$.

$$\frac{7\pi}{6} = \pi + \frac{1}{6}\pi$$



$$\cos(7\pi/6) = -\frac{\sqrt{3}}{2}$$

Answer: $-\sqrt{3}/2$

4. Write the equation of the line between the points $(1,5)$ and $(-2,3)$ in the y-intercept form: $y = mx + b$.

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

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

$$y = 5 + \frac{2}{3}(x-1) = \frac{2}{3}x - \frac{13}{3}$$

Answer: $y = \frac{2}{3}x - \frac{13}{3}$

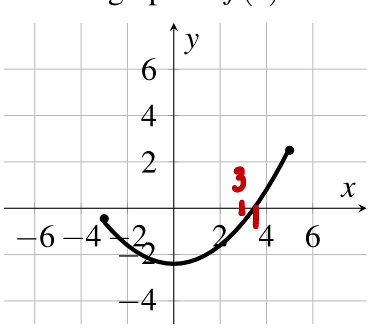
$$5 - \frac{2}{3} = \frac{15-2}{3} = \frac{13}{3}$$

5. Simplify the expression $\left(\frac{3x^{\frac{1}{2}}y^5}{xy^2}\right)^2$. Write your answer without negative exponents.

$$\left(\frac{3x^{1/2}y^5}{xy^2}\right)^2 = \frac{9xy^{10}}{x^2y^4} = \frac{9y^6}{x}$$

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

6. Use the graph of $f(x)$ below to estimate the value of x such that $f(x) = 0$.



Answer: $x = 3.5$ *

* Note: Any answer between 3 and 4 would be acceptable.

7. Expand and simplify $3(x-6)-2(x^2-1)$.

$-2x^2+3x-16$

$3(x-6)-2(x^2-1)=3x-18-2x^2+2$

$=-2x^2+3x-16$

8. Solve the equation $x^2=x+20$.

$x=5$ or $x=-4$

$x^2-x-20=0$

$(x-5)(x+4)=0$

$x=5$ or $x=-4$

9. Given the piecewise defined function below, determine the value(s) of x such that $f(x)=4$.

$$f(x)=\begin{cases} x^2 & x \le 1 \\ x+1 & x>1 \end{cases}.$$

$x=-2,\ x=3$

For $x^2=4$ we need $x=\pm 2$. Only $x=-2$ is in the domain.

for $x+1=4$, we need $x=3$

10. Determine where the graphs of $y=2x-1$ and $y=\sqrt{x}$ intersect.

$x=1$ or $x=1/4$

$2x-1=\sqrt{x}$

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

$4x^2-4x+1=x$

$4x^2-5x+1=0$

$x=\frac{5\pm\sqrt{25-16}}{8}$

$=\frac{5\pm 3}{8}=1$ or $\frac{1}{4}$

or factor:

$4x^2-5x+1=(4x-1)(x-1)$

11. For the function $f(x)=\frac{1}{x}$, find the expression $f(3)-f(3+h)$. Simplify your answer if possible.

$\frac{h}{3(3+h)}$

$f(3)-f(3+h)=\frac{1}{3}-\frac{1}{3+h}$

$=\frac{3+h-3}{3(3+h)}=\frac{h}{3(3+h)}$

12. Evaluate $\sin^{-1}(\frac{-1}{2})$.

$-\pi/6$

Find θ, $-\frac{\pi}{2} \le \theta \le \pi/2$

so that

$\sin\theta = -\frac{1}{2}$

13. Given $f(x) = 2x^2 + x$ and $g(x) = e^x$, find $(f \circ g)(x)$. You do not need to simplify your answer.

$f(g(x)) = f(e^x) = 2(e^x)^2 + e^x$

$2(e^x)^2 + e^x = 2e^{2x} + e^x$

14. Solve for x in the equation $1 + e^{2-x} = 4$.

$x = 2 - \ln 3$

$1 + e^{2-x} = 4$

$e^{2-x} = 3$

$2 - x = \ln 3$

$x = 2 - \ln 3$

15. Determine the domain of $f(x) = \sqrt{2-4x}$. *

Interval notation.

$(-\infty, \frac{1}{2}]$

We want $2 - 4x \geq 0$

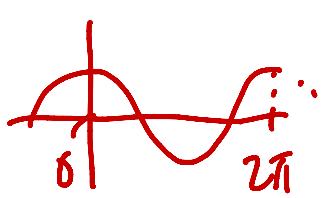
So $2 \geq 4x$ or $x \leq \frac{1}{2}$

16. Solve for θ in the equation $\cos(\theta) = 1$.

$\theta = 2\pi k$ for all integers k

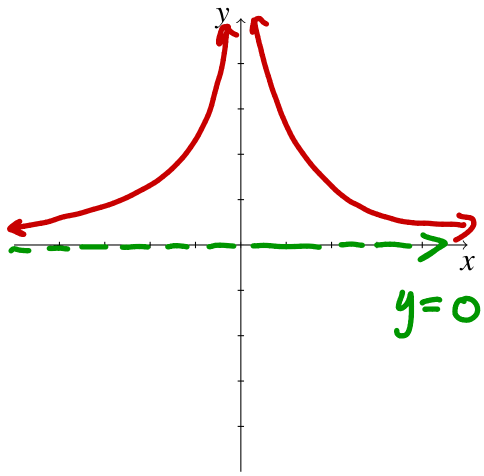
or

$\theta = \ldots -2\pi, 0, 2\pi, 4\pi, \ldots$

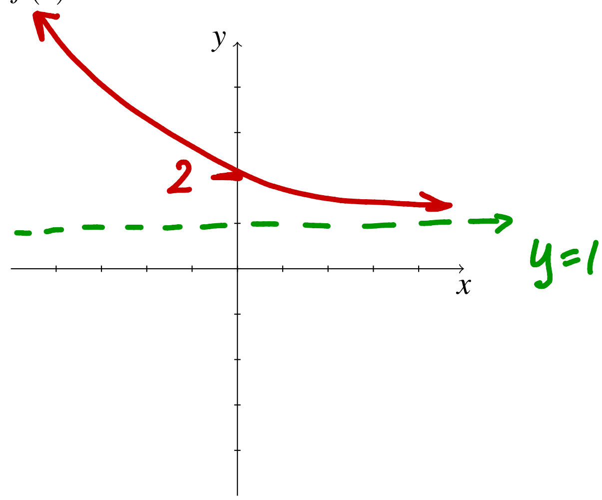


Graph the following functions. * label intercepts and asymptotes.

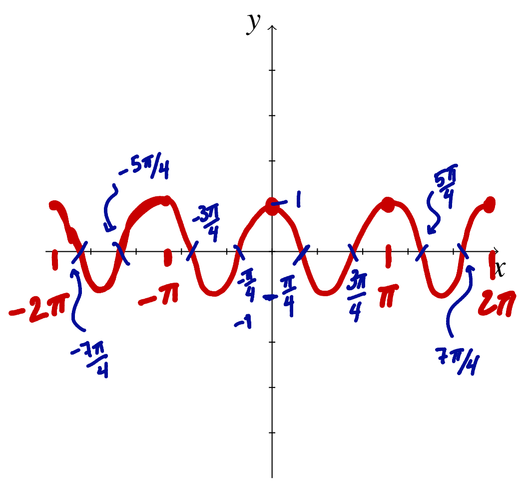
17. $f(x) = \frac{1}{x^2}$



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

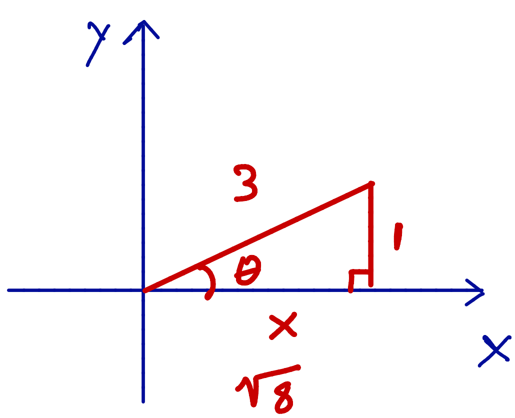


19. $f(x) = \cos(2x)$ on the interval $[-2\pi, 2\pi]$



20. Use triangles to determine $\tan\theta$ assuming $\sin\theta = \frac{1}{3}$ and θ is in the first quadrant.

$\frac{1}{\sqrt{8}}$



$1^2 + x^2 = 3^2$

So $x = \sqrt{8}$

$\tan\theta = \frac{\text{opp}}{\text{adj}} = \frac{1}{\sqrt{8}}$