Calculus Readiness Self-Assessment

This Calculus Readiness Tool may be used to self-assess your preparation for Calculus I. Mastery of the concepts and skills included in this tool are critical for success in Calculus 1.

Guidelines:

- For an accurate assessment of your readiness, take this test without any help aids, including any sort of calculator.
- Other than a brief review, try not to 'study' for this assessment. You want to truly assess what you know now.
- Show all of your steps clearly so that your reasoning is clear.
- Work through the problems within a two-hour window.

When you finish, return to the TTU Math department website to find the answer document and score your work.

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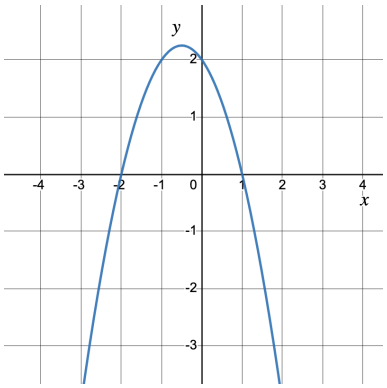
1. If $f(x) = \frac{x^2-5}{x+5}$, then find $f(a+2)$.
2. Find the slope-intercept equation of the line which passes through the point $(-5, 1)$ and is parallel to the line through the points $(3, 7)$ and $(1, -1)$
3. If f is a function whose graph is shown below, give the solution to the inequality $f(x) > 0$.



4. Find all solutions, if any, to the following:
   (a) $\sqrt{5x+2} - 4 = 6$
   (b) $|3x - 2| \geq 1$
5. Determine whether the following functions are invertible. If the function is invertible, find the inverse. If the function is not invertible, explain why not.

(a) $f(x) = \frac{x}{x+2}$

(b) $g(x) = (x-1)^2 + 3$

6. Simplify each of the following expressions fully, so that x and y appear once.

   (a) $\frac{x^3 y^5 x^{-2}}{x^{-2} y^2}$

   (b) $\frac{\sqrt[4]{16x^6 y^{14}}}{\sqrt[5]{x^2 y^5}}$

7. Given the double-angle identity $\cos(2x) = 1 - 2\sin^2 x$, solve the following trigonometric equation. Give all solutions in the interval $[0, 2\pi]$.

$$3\cos(2x) = \sin x + 2$$

8. Simplify the following expression:

$$\frac{\frac{5}{x+h+1} - \frac{5}{x+1}}{h}$$

9. Let $f(x) = x^2 + 3x + 7$ and $g(x) = \cos x$.

   (a) Find $(f \circ g)(x)$.

   (b) If $(h \circ g)(x) = e^{\cos x + 7}$, find $h(x)$.

10. Give all solutions to the following trigonometric equation:

$$3\tan(x) + 1 = 4$$

11. Solve the following equation: (Hint: First multiply both sides by e^x)

$$e^x - e^{-x} = 1$$

12. Let $f(x) = \log_{10}(x) = \log(x)$.

    (a) State the domain and range of $f(x)$.

    (b) Find $f^{-1}(x)$.

    (c) Find the exact value of $f(\sqrt{1000}) + f\left(\frac{1}{10}\right)$.

13. Consider the function $f(x) = \frac{(9x^2-4)(2x+1)}{x^3+2x^2+5x+10}$.

    (a) What is the domain of $f(x)$?

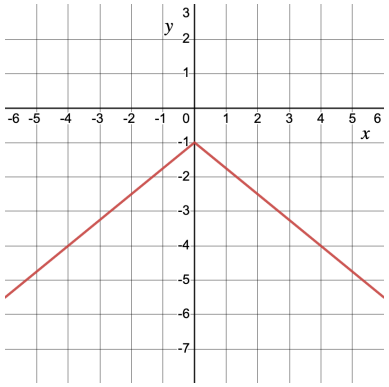
    (b) What are the roots (zeroes), if any, of $f(x)$?

    (c) What are the vertical and horizontal asymptotes, if any, of $f(x)$?

14. For the functions below carefully sketch each graph and give the domain and range.

    (a) $f(x) = 2\sin(-\frac{1}{2}x)$

    (b) The function $y = -g(2x) - 3$, given the graph of g below.



15. Find the values of the remaining five trigonometric ratios if $\tan(x) = 2$ and $0 < x < \frac{\pi}{2}$.

16. Given that the hyperbolic cosine function is defined as $\cosh(x) = \frac{e^x + e^{-x}}{2}$ and the hyperbolic sine function is defined as $\sinh(x) = \frac{e^x - e^{-x}}{2}$, simplify the following expression:

$$5\sinh^2(x) - 5\cosh^2(x)$$

17. Solve the following equation:

$$\log(x+2) - \log(x) = \log(3)$$