RU READY DIAGNOSTIC TEST REVIEW PROBLEMS: CALCULUS

The actual questions on the RU Ready Diagnostic test may be different from these, but will in fact cover algebra and precalculus topics such as these.

1. Solve the following equations:
   a) \[3x - 2(2x + 3) = 5 - [2x - 3(4 - x)]\]
   b) \[3x - 2(2x + 3) = 5x - [2x - (7 - 4x)]\]

2. Solve the following inequalities. Express your answer using interval notation and graph the solution on the real number line.
   a) \[2 - x \leq 3 - (5x - 4)\]
   b) \[-5 < \frac{1}{4}(x - 4) - 2(4 - x)\]
   c) \[-7 < 2 - 3x \leq 5\]

3. Given \(f(x) = 3x^2 - 5x + 4\), \(g(x) = \frac{3x}{x - 2}\), and \(h(x) = \sqrt{2 - x}\), find the following values if they exist:
   a) \(f(3), f(-3), g(2), g(-2), h(1), h(4)\)
   b) \(f(x - 1), g(x + h), h(x + 2)\)

4. If \(f(x) = x^2 - 3x + 5\) and \(g(x) = \frac{5}{x - 2}\), find and simplify:
   a) \(\frac{f(x + h) - f(x)}{h}\)
   b) \(\frac{g(x + h) - g(x)}{h}\)

5. Factor the following completely (if possible):
   a) \(5x^2 - 7x + 6\)
   b) \(8x^3y - 50xy^3\)
   c) \(5x(x+2)+7(x+2)\)
6. Find the equation of the following lines: express your answer in slope-intercept form.

a) The line passing through (-2,5) and (4,9).

b) The equation of the line that passes through the point (-2,3) and is parallel to the line $5x + 3y =12$.

c) The equation of the line that passes through the point (-2,3) and is perpendicular to the line $5x + 3y =12$.

d) The equation of the line with $x$-intercept 5 and $y$-intercept –2.

7. Use the graph of $y = f(x)$ below to answer the following questions:

![Graph of y = f(x)](image)

a) Find $f(-1)$.

b) Find $x$ such that $f(x) = 0$.

c) What is the domain of this function?

d) Which is larger: $f(-2)$ or $f(2)$?

e) What is $f(4) – f(-1)$?

8. Solve for $x$ by factoring:

a) $6x^2 – 19x = -10$

b) $x(2x – 3) = x^2 + 10$
9. Solve for $x$: \( \frac{5}{x-1} - \frac{7}{x} = \frac{3}{2x-2} \)

10. Perform the operations and express your answer in simplest form.
   a) \( \frac{4}{2x^2 + 3x} - \frac{2x - 5}{6x + 9} \)
   b) \( \frac{2x^2}{x^2 - 10x + 25} - \frac{x + 5}{x - 5} \)

11. Solve explicitly for $x$:
   a) $3x + 2y - 5 = ax + by + 1$
   b) $y = \frac{3x - 5}{x + 7}$

12. Perform the operations and simplify the following. Express your answers with positive exponents only.
   a) \( (-3a^{-2}b^4)(2a^3b^{-6})^{-2} \)
   b) \( (8a^{-6}b^4)^{1/3} (2a^3b^{-2/3}) \)
   c) \( \left( \frac{x^{-1/3}y^{1/2}}{x^{1/2}y^{-4}} \right)^{-3} \)

13. Evaluate the following:
   a) \( \frac{3}{27^{2/3}} \)
   b) \( (-32)^{-3/5} \)

14. Solve the following for $x$: \( \sqrt{x - 3} + 5 = x \)
15. Solve the following equations: *express your answer in simplest form.*
   
a) \( x^2 - 2x = 5 \)

b) \( (x - 4)(2x + 3) = x^2 - 4 \)

16. Write in simplest radical form:
   
a) \( 2\sqrt{200} - \sqrt{98} \)

b) \( \sqrt{32x^3} - x\sqrt{8x} + 2\sqrt{25} \)

c) \( \frac{2}{\sqrt{3x^2y}} \)

d) \( \frac{6\sqrt{2}}{\sqrt{6} - 2} \)

17. Find the domain of the following functions.
   
a) \( f(x) = \frac{3x - 1}{x + 4} \)

b) \( g(x) = \sqrt{4 - x^2} \)

18. Solve the following inequalities: express your answer using *interval notation*
   
a) \( x^2 - 8x + 7 \geq 0 \)

b) \( 2x^2 - 5x < 3 \)

c) \( \frac{3x - 1}{x - 4} \geq 0 \)

19. Sketch the graph of the following:
   Using interval notation, state the domain and the range. State the equation(s) of the asymptote(s). Find the x- and y-intercepts where they exist.
   
a) \( f(x) = 3^{x-2} + 4 \)

b) \( f(x) = \log_{10}(x - 1) + 2 \)
20. Evaluate the following EXACTLY.
   a) \( \log_2 \sqrt[5]{64} \)
   b) \( \log_3 \sqrt[19]{81} \)

21. Find the EXACT solution for the following:
   a) \( \log_{10}(x - 3) = 1 - \log_{10}(x) \)
   b) \( 2^{x+1} = 8^{3x} \)
   c) \( x^2 e^x - 2e^x = 0 \)

22. Use the values \( \log_2(5) = 2.32 \) and \( \log_2(3) = 1.58 \) to find:
   a) \( \log_2 (15) \)
   b) \( \log_2 \left( \frac{5}{3} \right) \)

23. If \( \cos t = \frac{4}{7} \) and \( \frac{3\pi}{2} < t < 2\pi \), find \( \tan t \)

24. Given the following equations, find all solutions in the interval \( [0, 2\pi] \) in radians:
   a) \( 2 \sin x + 3 = 4 \)
   b) \( 2 \cos^2 x + \cos x - 3 = 0 \)

25. Given the triangle below, \( \tan \theta = \)

   ![Triangle Diagram](image)