CALCULUS I

Sample Standards Assessment

1. Possible Objectives: 1

   Evaluate the limit, or determine that it does not exist.

   $$\lim_{x \to -2} \frac{x^2 + 6x + 8}{x + 2}$$

2. Possible Objectives: 2

   Evaluate the limit, or determine that it does not exist.

   $$\lim_{x \to \infty} \frac{x^3 + 5x - 1}{5x^2 + 4}$$

3. Possible Objectives:1, 3

   Evaluate the limit, or determine that it does not exist.

   $$\lim_{x \to 3} \frac{2x}{3 - x}$$

4. Possible Objectives: 1,2,3,4

   Use limits to find all vertical and horizontal asymptotes of this function.

   $$f(x) = \frac{3x^2 - 4}{2x^2 - 2}$$

5. Possible Objectives:1, 5

   Use the definition to show that the given function is **not** continuous at the point $x = 1$.

   $$f(x) = \begin{cases} 2x + 1 & \text{if } x \neq 5 \\ 3 & \text{if } x = 5 \end{cases}$$

6. Possible Objectives:6

   Apply the Intermediate Value Theorem to show that the function has a root in the interval $[0, \pi]$. State any hypothesis you use.

   $$f(x) = \cos(x)$$

7. Possible Objectives:1, 7

   Find the derivative of the following function, using the limit definition.

   $$f(x) = 5 - 2x$$

8. Possible Objectives: 8

   Find the derivative of

   $$y = \frac{4x^2 + \sqrt{x}}{x}$$

   without using the quotient rule.

9. Possible Objectives: 9

   Given $y = \sec\theta$, find $\frac{dy}{d\theta}$

10. Possible Objectives: 8, 9, 10

    Find the first derivative of

    $$f(x) = \tan(x)(3x^5 - \sqrt{x})$$

11. Possible Objectives: 8, 9, 11

    Find the first derivative of

    $$f(x) = \frac{\tan(x)}{3x^5 - \sqrt{x}}$$

12. Possible Objectives: 8, 9, 12

    Find the first derivative of

    $$f(x) = \tan 3x^5 - \sqrt{x}$$

13. Possible Objectives: 8, 9, 10, 11, 12, 13

Find the first derivative of
$$f(x) = \frac{\tan(3x^3)(2 - \sqrt{x})}{\cos(x + 5)}$$

14. Possible Objectives: 8, 9, 10, 11, 12, 13, 14

Find the equation of the tangent line to the curve $y = x^3 + \cos(x)$ at the point $x = 0$.

15. Possible Objectives: 8, 9, 10, 11, 12, 13, 15

Find $\frac{dy}{dt}$
$$xy = 2y^3$$

16. Possible Objectives: 8, 9, 10, 11, 12, 13, 15, 16, 17

A 15 foot ladder is resting against the wall. The bottom is initially 10 feet away from the wall and is being pushed towards the wall at a rate of 1/4 ft/sec. How fast is the top of the ladder moving up the wall 12 seconds after we start pushing? (Note that this can count for objectives 16 and 17. Be very clear with your setup.)