

## EXAMINATION I MATH 1571

1. Define  $P$  such that the following function is continuous at  $x = 2$ .

$$f(x) = \begin{cases} \frac{(x^2 - 6x + 8)}{x^3 - 2x^2 + 2x - 4} & \text{if } x \neq 2 \\ P & \text{if } x = 2 \end{cases}$$

2. Find  $\lim_{x \rightarrow -1^+} f(x)$  for

$$f(x) = \begin{cases} -5x - 7 & \text{if } x < -1 \\ 7 & \text{if } x = -1 \\ -5x - 12 & \text{if } x > -1 \end{cases}$$

3.  $\lim_{x \rightarrow -3^+} \frac{x^2 + 9}{x + 3}$  is:

4.  $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x^2 + 8x + 15}$  is:

5. If  $y = \cos(x) \tan(x)$ , then  $D_x y$  is:

6. If  $y = \frac{1}{x^2}$ , then  $D_x y$  is:

7. If  $y = \frac{x^3}{4} - \frac{4}{x^3}$ , then  $D_x y$  is:

8. If  $y = x^4 - x^3 - 3x^2$ , then  $D_x y$  is:

9. If  $y = \sin(x) \cos(x)$ , then  $D_x y$  is:
10.  $f(x) = -4x^3 + 3x^2 + 18x + 77$  has a horizontal tangent at
11. If  $y = 3x^{\frac{4}{3}}$ , then  $D_x^2 y$
12. Find the equation of the tangent line to the curve  $f(x) = 9x^4 + 8x^3 - 5$  at  $x = 1$
13. Find  $y'$  for  $y = \frac{x-1}{x^2-4}$
14. What is the slope of the curve  $y = x^2 - 3x - 4$  as it crosses the positive part of the  $x$ -axis.
15. Find  $y'$  for  $y = x^3 * \sin(x)$
16. For  $f(x) = \sqrt{x}$  find, using ONLY the limit definition of a derivative,  $f'(x)$