

MATH 9 - FINAL REVIEW PROBLEMS

These problems are intended for practice, they are not intended as a comprehensive review.

- (1) Find the domain : $f(x) = \sqrt{4x^2 - 11x - 3}$, $g(x) = \frac{\ln(1-x)}{x+2}$, $h(x) = \tan(2x)$
- (2) The point P lies in the first quadrant on the graph of the line $y = 4 - 2x$. From the point P, perpendiculars are drawn to both the x-axis and the y-axis. What is the largest possible area for the rectangle thus formed?
- (3) Sketch the graph of $9x^2 + 4y^2 - 18x - 27 = 0$, and discuss.
- (4) Find the equation of the line which passes through the vertex of $f(x) = x^2 - 4x + 1$ and is perpendicular to the line $2x - 3y = 8$.
- (5) Given $f(x) = 1 - e^x$ find the following.
 (a) $f^{-1}(x)$
 (b) domain and range of $f(x)$ and $f^{-1}(x)$.
 (c) graph $f(x)$ and $f^{-1}(x)$
- (6) Graph $f(x) = -3 \cos(2x - 2\pi/3)$
- (7) Sketch the graph of f.

$$f(x) = \begin{cases} 3x + 1 & \text{if } x < 1 \\ 4 & \text{if } 1 \leq x < 3 \\ (x-4)^2 - 2 & \text{if } x \geq 3 \end{cases}$$
- (8) Find the x intercepts of the polynomial $f(x) = x^4 + 5x^3 + 3x^2 - 9x$ and sketch the graph. Use knowledge of behavior near intercepts and end behavior, do not make a table of points.
- (9) Find all solutions in $[0, 2\pi)$: $\tan^2 2x - 1 = 0$
- (10) Find all solutions: $2 \cos^2 x - \sin x = 1$
- (11) Given the matrix $B = \begin{bmatrix} 5 & 0 & 2 \\ 2 & 2 & 1 \\ -3 & 1 & -1 \end{bmatrix}$ find $\det(B)$ and find B^{-1} .
- (12) Use matrix methods (Gaussian elimination or Gauss Jordan) to solve:
 $x + 2y + z = 3$
 $2x + y + z = 16$
 $x + y + 2z = 9$
- (13) Given $f(x) = x^2 - 4$, $g(x) = 1/x$, find and simplify: (a) $\frac{f(x+h) - f(x)}{h}$, (b) $g(f(x))$
- (14) Solve: $10 = 3e^{1-2x}$
- (15) Solve: $\log_3 x + \log_3(x+2) = 1$
- (16) Simplify:
 (a) $\frac{(7-3x)^{1/2} + \frac{3}{2}x(7-3x)^{-1/2}}{7-3x}$ (b) $\frac{2\sqrt{1+x} - \frac{x}{\sqrt{1+x}}}{1+x}$ (c) $\frac{2x}{(x+3)^2} - \frac{1}{x^2-9}$
- (17) Graph $f(x) = \frac{3x}{(x-2)^2}$ Show all key features of graph.