

MAT 1375 Final Exam Review sheet

1. Find the x- and y-intercepts, the domain, the vertical and horizontal asymptotes, and then sketch a complete graph of the function.

$$f(x) = \frac{x^3 + 2x^2 - x - 2}{x^2 + 5x + 6}$$

2. Find the difference quotient $\frac{f(x+h) - f(x)}{h}$ (assume $h \neq 0$) for:

a) $f(x) = 6x^2 + 2x - 7$ b) $f(x) = -9x^2 + 3x + 12$ c) $f(x) = 5x^2 - 4x + 20$

3. Solve the inequality and express the solution as an interval.

a) $-x^2 - 4x \leq -20$ b) $\frac{2x+3}{x^2-4x+17} \geq 0$ c) $\frac{3}{x-7} \geq \frac{4}{x-8}$

4. Find the domain, asymptotes, and x-intercepts of the function, and then sketch its graph.

$$\log_2(x-3) + \log_2(x+3) = 4$$

5. Find the polynomial function $f(x)$ with real coefficient that has $-1, 1,$ and i as zeros and such that $f(3) = 160$. Also, describe the graph of the polynomial form.

6. State the amplitude, period and phase shift, and then sketch are complete cycle of the graph. Label all maxima, minima and x-intercepts.

$$y = \sin\left(x + \frac{\pi}{6}\right) + 2$$

7. Find all exact solutions in radians.

a) $3 \tan^2 x = \tan x$ b) $2 \cos^2 x - \cos x = 6$

8. In 1923, the population of a state is 5,000 and is growing at a rate of 6% per year.

a) What will the population be in 1960? b) In what year will the population be double?

9. Find the magnitude and the direction angle for:

a) $v = \langle 1, -7 \rangle$ b) $v = \langle -6\sqrt{2}, 3 \rangle$ c) $v = \langle -\sqrt{3}, 4 \rangle$

10. Use the Binomial Theorem to write the following terms in simplest form.

a) Find the first five terms of the expansion of $\left(3x - \frac{y}{7}\right)^{16}$

b) Find the 10th term in the expansion of $\left(6x - \frac{y}{2}\right)^{12}$

c) Find the expansion of $\left(\frac{x}{4} + y\right)^5$