

Advanced Functions Exam Review

Part 1

Polynomial Functions

1. If given one factor of a polynomial, find the other factor. Example: $x+3$ is a factor of x^3+5x^2-18 . Find another factor.
2. On what intervals is $(x+3)(x-4)>0$?
3. Be able to find the remainder when two polynomial functions are divided. Find the remainder of x^4+3x^2+2 divided by $x-2$.
4. How many zeroes can each of the following functions have at most
 - a) linear, quadratic, cubic, quartic, quintic, polynomial of n degree
5. Understand the slope formula as an average rate of change in the following ways
 - a) $m = \frac{y_2 - y_1}{x_2 - x_1}$ or $m = \frac{f(b) - f(a)}{b - a}$
6. Be able to determine whether a function is odd or even from its equation, and/or graph. Example. Is the function $f(x) = x^4 + x^2$ even or odd? Explain. (Use the definition in the answer is necessary).
7. Determine if a binomial is a factor of a particular polynomial. Example: Is $(x+3)$ a factor of $x^2 + 3x - 10$?
8. Given a polynomial function in factored form, draw the graph. Example:
 $y = -3(x+2)^2(x-3)(2x-5)$

Rational Functions

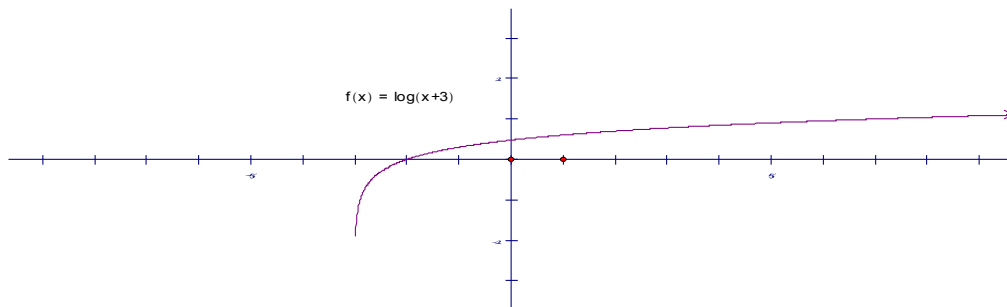
1. Determine the vertical asymptotes of a rational function which you have to factor first.
Example: What are the vertical asymptotes of $\frac{1}{3x^2+17x+10}$?
2. Determine the horizontal asymptote of a given rational function. Example 1: $y = \frac{3x^3 - 5x + 6}{5x^3 + 3x^2}$
Example 2: $y = \frac{5}{x^2}$
3. Be able to graph a given rational function. Example: $f(x) = \frac{(x^2+9)(x-2)}{x^2(x+3)}$.
4. Solve inequalities. Example: $\frac{3x}{(x-6)} < \frac{-5x}{(2x+1)}$, state any restrictions.

Trigonometry

1. Solve simply and complex trigonometric equations. Example1: Solve $\sin \theta = \frac{\sqrt{3}}{2}$
Example2: $\sin^2 \theta + \sin \theta - 1 = 0$
2. Apply the double angle formulas: Example: Find $\sin 2\theta$ given $\tan \theta = 1$.
3. Apply the addition and subtraction formulas: Example: Evaluate exactly: $\cos \frac{\pi}{12}$.
4. Use the cofunctional identities for any given function. Example: $\cos \frac{5\pi}{12}$
5. Prove a given trigonometric identity: Example: $\frac{1}{1 + \sin x} = \sec^2 x - \frac{\tan x}{\cos x}$
6. Given information about a trigonometric function, state the equation. Example: an amplitude of 3, a phase shift to the right of pi and a vertical shift up of 3.

Logarithmic Functions

1. Evaluate simple and complex logarithmic functions exactly. Example1: $\log \frac{1}{100}$.
Example2: $a^{16 \log_a a^{0.75}}$
2. Apply Logarithm laws and properties to evaluate logs exactly Example1: $\log_6 12 + \log_6 3$.
Example2: Write as a single logarithm $\log 5x - [\log x^2 + \log(x-3)]$.
3. Evaluate logarithmic expression with bases other than 10. Example: $\log_2 70$.
4. Solve equations with logs. Example: $3 - \log_4(x^2 + 2) = 0$
5. Given the graph of a function, give it's equation. Example:



6. Graph a logarithmic function given its equation. Example: $2\log(x+5) - 6$.
7. Be able to solve exponential problems using logs. Example: The amount of bacterial grows according function. $p(t) = 22(3^{\frac{t}{5}})$, where p is the population is 1000s and t ithe time in minutes it has been exposed. If the population is 24×10^4 , how long as it been exposed.
8. Understand the restrictions of log.
9. Apply transformations on logarithmic equations. Example: graph $\log(2x)$

Combining Functions

1. Given two functions, find the composite. Example: $F(x)=3x$ and $G(x)=2x^3+3$, find $F(G(x))$
2. Given the domain of two different functions, be able to find the domain of the sum of the two functions.
3. Be able to find the composite of two functions for a word problem. Example: Given that the radius of fire widens 3m each day. Build a function that describes the radius of the fire after 12 days.
4. Given two graphs, find the values the composite of the two function of a particular value.

Example: Find $F(g(\pi))$

$$f(x) = x+3$$

$$g(x) = \sin(x)$$

