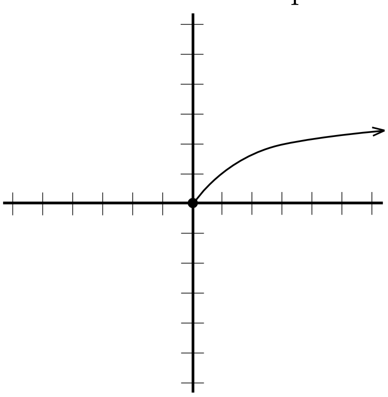
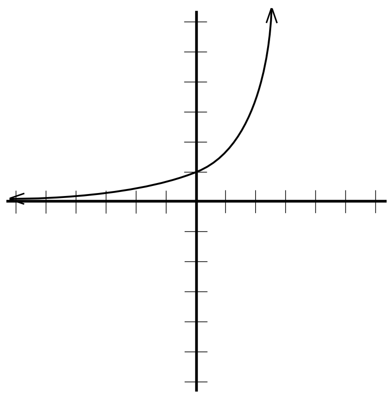
MATH 124 - SECTION 2
Exam #1 Review Problems

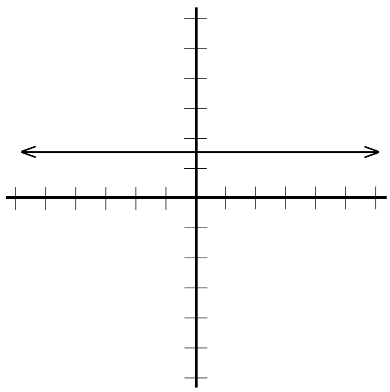
1. Identify the type of function shown in each graph. Possible answers can include constant, linear, quadratic, polynomial of degree 3 or higher, exponential, square root, rational function, $a\sin(kx)$, $a\cos(kx)$, $a\tan(kx)$, or none of the above. You do not need to find the equation of the function.



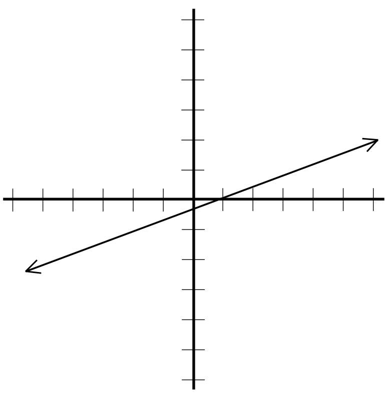
A)



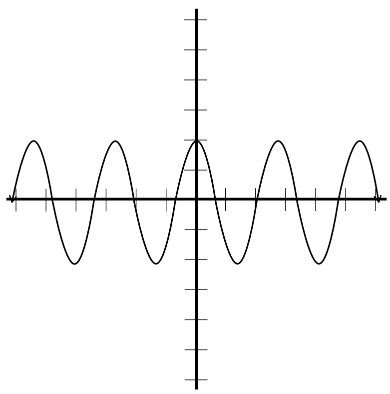
B)



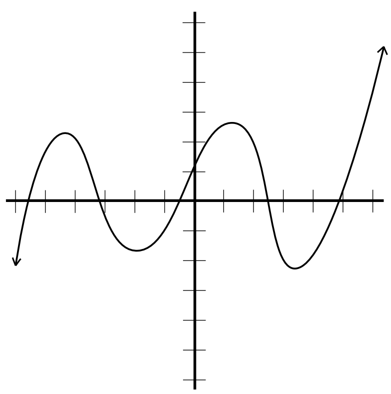
C)



D)



E)



F)

2. Is $f(t) = \dfrac{\sin t}{t^2}$ continuous on $[-1, 1]$?

3. Solve $e^{10x} = 10^{ex+1}$ for x.

4. Find $\lim_{t \to t} \dfrac{\frac{1}{t} - \frac{1}{2}}{t^3 - 8}$ and the slope of $\sqrt{x}$ when $x = 4$.

5. Find a polynomial with $x = -2, 0, 1$ for zeros and turning points at $x = -2, 1$.

6. Find a polynomial that passes through the points $(-1, 1)$, $(3, 1)$ and $(0, 2)$. It should turn at $x = -1$. (Hint: there is a sneaky trick for making this problem similar to the last one).

7. If $1 + \frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \cdots + \frac{1}{3^n} = \sum_{k=0}^{n} \left(\frac{1}{3}\right)^k = \frac{1 - \left(\frac{1}{3}\right)^n}{1 - \frac{1}{3}}$, find $\sum_{k=0}^{\infty} \left(\frac{1}{3}\right)^k$. You may which to think about taking the limit of the partial sums.

8. Find $\lim_{x \to \infty} 2^x$ and $\lim_{x \to \infty} e^{-x}$.

9. Simplify $1 - (1 + z^{-1})^{-1}$

10. What is the domain of $\frac{1}{\sqrt[3]{x}}$? What is the domain of $\frac{x+3}{\sqrt{2-x}}$?

11. If the cost C of a product is inversely proportional to the supply S, write the cost as a function of the supply, where k is some unknown constant.

12. Find the domain of the function $\frac{\sqrt{x+2} + \log(4-x)}{x^2 + 7x}$. Hint: be careful and thorough.

13. **Hard:** Recall that a prime number is one with no divisors other than 1 and itself. The first few prime numbers are $2, 3, 5, 7, 11, 13, 17, \ldots$. Let $\pi(x)$ be the function that counts the number of primes less than or equal to x, for example $\pi(8) = 4$. The domain of $\pi(x)$ is all positive real numbers; determine if $\pi(x)$ is one to one. Justify your answer.