

Math 111 Quiz #9 Solutions

1. (a) To determine the domain of $f(x)$ we must find values for which the denominator is equal to zero because we must avoid division by zero.

Since $x^2 + 1$ is never equal to zero (solutions of $x^2 + 1 = 0$ are imaginary numbers), the domain of $f(x)$ is all real numbers or $(-\infty, \infty)$.

- (b) To find the zeros of $f(x)$, we must find values for which the numerator is equal to zero.

$$4x^2 - 16 = 0 \quad \Rightarrow \quad 4x^2 = 16 \quad \Rightarrow \quad x^2 = 4 \quad \Rightarrow \quad x = \pm 2$$

So, the zeros of $f(x)$ are $x = 2$ and $x = -2$.

- (c) In the long-run, $f(x) \approx \frac{4x^2}{x^2} = 4$. So, the values of the function approach 4 as $x \rightarrow \infty$ or $x \rightarrow -\infty$.

So, $f(x)$ has the horizontal asymptote $y = 4$.

2. Using $A = P(1 + rt)$ with $P = 7500$, $r = 0.09$, $t = \frac{18}{12} = 1.5$:

$$A = 7500(1 + 0.09(1.5)) = 8512.5$$

So, you will have to pay \$8512.50.

3. Using $A = P(1 + \frac{r}{k})^{kt}$ with $A = 15,000$, $r = 0.1$, $k = 4$, $t = 10$:

$$15,000 = P(1 + \frac{0.1}{4})^{4(10)} = P(1.025)^{40} \quad \Rightarrow \quad P = \frac{15,000}{(1.025)^{40}} = 5586.46$$

So, you will have to invest \$5586.46 today.