

6. [13 points]

a. [6 points] Let $P(x) = \frac{(x^2 - 2x - 4)^2}{7x^4 - 1400}$.

Find the following quantities. Your answers must be found algebraically and written in **exact form**. Show your work.

i) Find the equation(s) of the vertical asymptotes of $P(x)$:

Vertical asymptote(s): _____

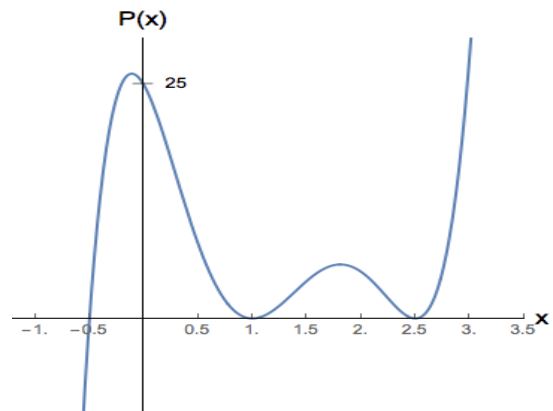
ii) Find the horizontal intercepts of $P(x)$.

Horizontal Intercepts: _____

iii) Does the graph of $y = P(x)$ have horizontal asymptotes? If so, write its equation, otherwise write "None".

Horizontal asymptote(s): _____

b. [5 points] Find the formula for the polynomial $P(x)$ of degree five shown below



$P(x) =$ _____

(Problem continues on the next page)

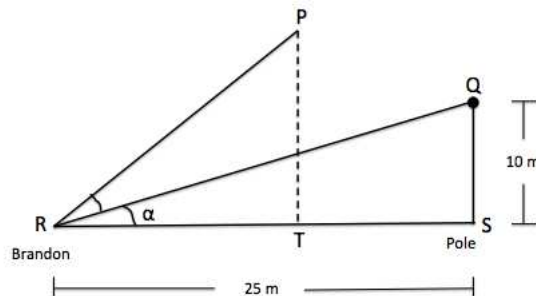
- c. [2 points] Write the equation of a rational function $R(x)$ that satisfies both conditions below:

- The graph of $y = R(x)$ has a vertical asymptote at $x = 1$.
- $\lim_{x \rightarrow \infty} R(x) = \infty$

There may be more than one correct answer. You only need to find one of them.

$$R(x) = \underline{\hspace{10cm}}$$

7. [5 points] Brandon takes a picture of a bird standing (at point Q) on top of a 10 meter high pole. The pole (at point S) is 25 meters away from where Brandon stands (at point R).



- i) Find the value of the angle α (the angle SRQ) measured in **radians**. *Your answer must be written in **exact form** or accurate up to two decimals. Show all your work.*

$$\alpha = \underline{\hspace{10cm}}$$

- ii) The bird flies to the top of a nearby tree (point P). Brandon takes a second picture of the bird once it is at the top of the tree. The length of the segment RP is 20 meters. What is the height of the tree, the length of the segment PT, if you know that the angle QRP measures 0.75 radians.

*Your answer must be written in **exact form** or accurate up to two decimals. Show all your work.*

$$\text{Height of the tree} = \underline{\hspace{10cm}}$$