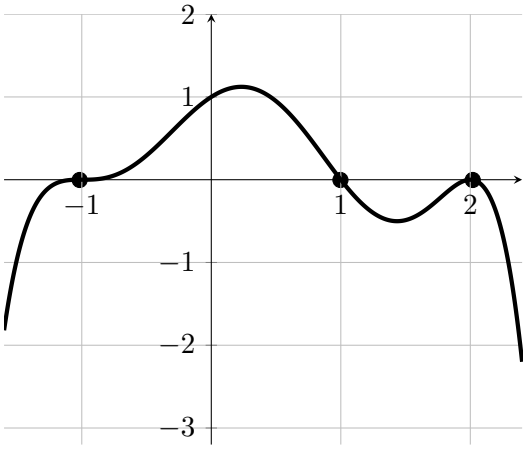
8. [8 points] The graph of the polynomial $p(x)$ is given below.



i) What are the zeros of the polynomial $p(x)$?

Answer: _____.

Solution: $x = -1, 1, 2$

ii) What is the vertical intercept of the graph of $p(x)$?

Answer: _____.

Solution: $p(0) = 1$ or $(0, 1)$

iii) Assume that the polynomial $p(x)$ has degree six. Use the vertical intercept to find a formula for $p(x)$.

$p(x) =$ _____.

Solution: Let $p(x) = a(x+1)^3(x-1)(x-2)^2$. Since $p(0) = 1$, we have that

$$1 = a(1)^3(-1)(-2)^2 = -4a.$$

So $p(x) = -\frac{1}{4}(x+1)^3(x-1)(x-2)^2$.