

1. Given $y = -3\cos\left(4x - \frac{\pi}{2}\right)$, find the following.

(2pt) Amplitude: _____

(3pts) Period: _____

$x =$ _____ 2. (5pts) Exactly solve $x^2e^x - xe^x = 6e^x$.

$p(x) =$ _____ 3. (5pts)
Find the polynomial $p(x)$, of lowest degree, with *integer* coefficients, with zeros of $4 - i$ and $\pm\sqrt{7}$, and with constant $a_0 = 357$. Write your answer in the form of $p(x) = a_nx^n + a_{n-1}x^{n-1} + \dots + a_1x^1 + a_0$.

_____ 4. (5pts) Put $\frac{5-2i}{i+3}$ in $a+bi$ form where a and b are real numbers.

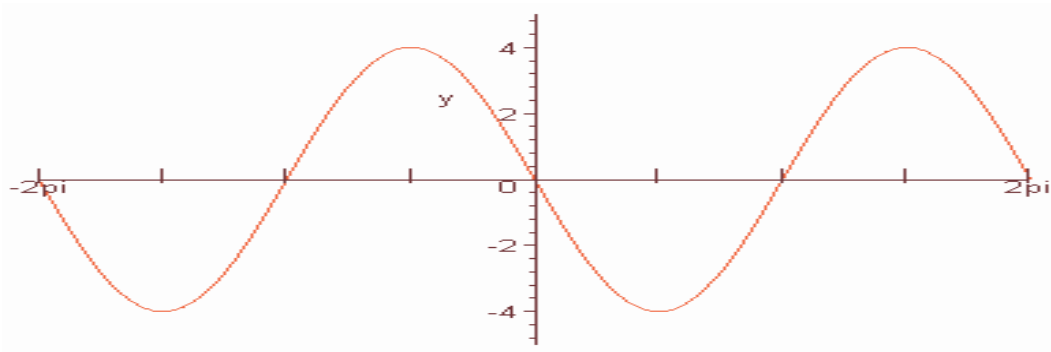
_____ 5. (5pts)
List all the asymptotes of $r(x) = \frac{x^3 - 2x^2 + 6}{x^2 + 2x - 143}$. Remember asymptotes are equations of lines.

_____ 6. (5pts) What is the sum of all the *possible positive rational* roots of the polynomial $p(x) = -2x^3 - 5x^2 + 6x - 15$?

7. (5pts) Use synthetic division to show 8 is a root of $p(x) = 5x^3 - 40x^2 - 180x + 1440$.

_____ 8. (5pts)
The half-life of bismuth-210 is 5 days. **Exactly** how long will it take for 40% of a sample to decay? Remember your units.

$y =$ _____ (5pts) 9. Write a function of the form $y = a \sin k(x - b)$ whose graph is shown below where a , k and b are **positive**.



_____ 10. (5pts) Find the domain in *interval notation* of $y = \log_b(25 - x^2)$.