1. (25 pts) Let $F$ be an antiderivative of the function $f$ whose graph is shown below.

![Graph of F and f](image)

a. Where is $F$ increasing? Give each entry in the interval as an integer, where applicable.
   
   $(-\infty, -5) \cup (2, \infty)$

b. Where is $F$ decreasing? Give each entry in the interval as an integer, where applicable.
   
   $(-5, 2)$

c. Where is $F$ concave up? Give each entry in the interval to the nearest half (0.5), where applicable.
   
   $(-3, 0.5)$

d. Where is $F$ concave down? Give each entry in the interval to the nearest half (0.5), where applicable.
   
   $(-\infty, -0.5)$

e. If $F(0) = 3$, sketch the graph of $F$ on the given coordinate plane.
   
   - Should have max at $x = -5$
   - Should have min at $x = 2$
   - Should have inflection point at $x = -\frac{3}{2}$
   - Should go through the point $(0, 3)$
2. (25 pts) Find the slope-intercept form of the tangent line to the curve \( f(x) = 2e^x \sin x \) at the point where \( x = 0 \).

\[
\begin{align*}
    f'(x) &= 2e^x \sin x + 2e^x \cos x \\
    f'(0) &= 2e^0 \sin 0 + 2e^0 \cos 0 \\
    &= 2(1)(0) + 2(1)(1) \\
    &= 2 \\
    f(0) &= 2e^0 \sin 0 = 2(1)(0) = 0 \\
    (0,0) \quad m &= 2 \\
    y - 0 &= 2(x - 0) \\
    \therefore \quad y &= 2x
\end{align*}
\]

3. (25 pts) If \( f(x) = \frac{4x^5 - 3x^2 - \pi}{6x^3 + x^4} \), then find \( f'(x) \) by using the quotient rule. Do not simplify.

\[
    f'(x) = \frac{(6x^3 + x^4)(20x^4 - 6x) - (4x^5 - 3x^2 - \pi)(3x^{-\frac{1}{2}} + 4x^3)}{(6x^3 + x^4)^2}
\]

NAME: ____________________________

MATH 131 SECTION (Circle one):

504  505  506

Circle First Letter of Last Name:

A-D  E-K  L-R  S-Z