Math 201 - Quiz #9 Name: key

1. Find $f(x)$ if $f''(x) = e^x + \cos(x)$, $f'(0) = 1$, and $f(0) = 4$.

$f'(x) = e^x + \sin(x) + C$

$f'(0) = e^0 + \sin(0) + C = 1$

$1 + 0 + C = 1$

$C = 0$

$f'(x) = e^x + \sin(x)$

$f(x) = e^x + (-\cos(x)) + D$

$f(0) = e^0 - \cos(0) + D = 4$

$1 - 1 + D = 4$

$D = 4$

$\boxed{f(x) = e^x - \cos(x) + 4}$

2. Find the most general antiderivative of the following:

(a) $f(x) = \dfrac{5x^2 + x - \sqrt{x} + 1}{x}$

$= \frac{5x^2}{x} + \frac{x}{x} - \frac{x^{1/2}}{x} + \frac{1}{x}$

$= 5x + 1 - x^{-1/2} + \frac{1}{x}$

$F(x) = \frac{5x^2}{2} + x - \frac{x^{1/2}}{1/2} + \ln|x| + C = \boxed{\frac{5}{2}x^2 + x - 2\sqrt{x} + \ln|x| + C}$

(b) $f(x) = 4x^2(x-3)^2 = 4x^2(x^2 - 6x + 9)$

$= 4x^4 - 4 \cdot 6x^3 + 4 \cdot 9x^2$

$= 4x^4 - 24x^3 + 36x^2$

$F(x) = \frac{4x^5}{5} - \frac{24x^4}{4} + \frac{36x^3}{3} + C = \boxed{\frac{4}{5}x^5 - 6x^4 + 12x^3 + C}$

3. Find $f(x)$ if $f'''(x) = 2e^x$.

$f''(x) = 2e^x + C$

$f'(x) = 2e^x + Cx + D$

$\boxed{f(x) = 2e^x + \frac{Cx^2}{2} + Dx + E}$