Mathematics 1a, Section 4.9 Solutions

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24.

$$
\begin{aligned}
f''(x) &= 3e^x + 5\sin x \\
f'(x) &= 3e^x - 5\cos x + C \\
f'(0) &= 2 \Rightarrow C = 4 \\
f'(x) &= 3e^x - 5\cos x + 4 \\
f(x) &= 3e^x - 5\sin x + 4x + D \\
f(0) &= 1 \Rightarrow D = -2 \\
f(x) &= 3e^x - 5\sin x + 4x - 2
\end{aligned}
$$

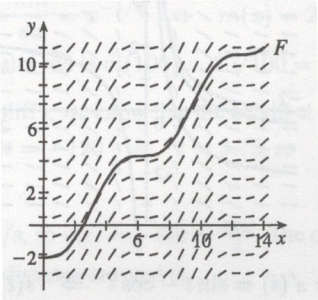
26.

$$
\begin{aligned}
f'(x) &= x^3 \\
f(x) &= \frac{1}{4}x^4 + C \\
x + y &= 0 \Rightarrow y = -x \\
m &= -1 = f'(x) \\
-1 &= x^3 \Rightarrow x = -1 \Rightarrow y = 1
\end{aligned}
$$

So we see $(-1, 1)$ is a point on the graph of f. From f, we get

$$
\begin{aligned}
1 &= \frac{1}{4}(-1)^4 + C \\
C &= \frac{3}{4} \\
f(x) &= \frac{1}{4}x^4 + \frac{3}{4}
\end{aligned}
$$

30.



36.

$$
\begin{aligned}
a(t) &= v'(t) = 5 + 4t - 2t^2 \\
v(t) &= 5t + 2t^2 - \frac{2}{3}t^3 + C \\
v(0) &= 3 \Rightarrow C = 3 \\
v(t) &= 5t + 2t^2 - \frac{2}{3}t^2 + 3 \\
v(t) &= s'(t) \\
s(t) &= \frac{5}{2}t^2 + \frac{2}{3}t^3 - \frac{1}{6}t^4 + 3t + D \\
s(0) &= 10 \Rightarrow D = 10
\end{aligned}
$$

So the particle's position after t seconds is given by

$$s(t) = \frac{5}{2}t^2 + \frac{2}{3}t^3 - \frac{1}{6}t^4 + 3t + 10$$