

Test 2

1.A

$$\begin{aligned}\vec{P} &= [x(t) + x_0] \hat{i} + [y(t) + y_0] \hat{j} \\ \vec{P} &= \left[\int x'(t) dt + x_0 \right] \hat{i} + \left[\int y'(t) dt + y_0 \right] \hat{j} \\ \vec{P} &= \left[\frac{1}{(t+1)^2} + 1 \right] \hat{i} + [\tanh(t)] \hat{j}\end{aligned}$$

1.C

The point never stops moving, as the velocity in the x direction, given by $x'(t)$ can never equal 0, as shown below

$$\begin{aligned}0 &= -\frac{2}{(t+1)^2} \\ 0 * (t+1)^2 &= -(t+1)^2 * \frac{2}{(t+1)^2} \\ 0 &= -2\end{aligned}$$

5.A

$$\begin{aligned}& \int \sin^{11} x \cos^6 x \, dx \\& \int \sin x (1 - \cos^2 x)^5 \cos^6 x \, dx \\& u = \cos x \\& du = -\sin x \, dx \\& - \int (1 - u^2)^5 u^6 \, du \\& - \int (1 - 5u^2 + 10u^4 - 10u^6 + 5u^8 - u^{10}) u^6 \, du \\& - \int (u^6 - 5u^8 + 10u^{10} - 10u^{12} + 5u^{14} - u^{16}) \, du \\& - \left(\frac{u^7}{7} - \frac{5u^9}{9} + \frac{10u^{11}}{11} - \frac{10u^{13}}{13} + \frac{u^{15}}{3} - \frac{u^{17}}{17} \right) + C \\& - \frac{u^7}{7} + \frac{5u^9}{9} - \frac{10u^{11}}{11} + \frac{10u^{13}}{13} - \frac{u^{15}}{3} + \frac{u^{17}}{17} + C \\& - \frac{\cos^7 x}{7} + \frac{5\cos^9 x}{9} - \frac{10\cos^{11} x}{11} + \frac{10\cos^{13} x}{13} - \frac{\cos^{15} x}{3} + \frac{\cos^{17} x}{17} + C\end{aligned}$$

1 Problem 7

$$\frac{a}{2x-3} + \frac{b}{x+2} = \frac{3x-5}{(2x-3)(x+2)}$$

$$ax + 2a + 2bx - 3b = 3x - 5$$

Substitute -2 for x

$$-7b = -5 - 6$$

$$b = \frac{11}{7}$$

Substitute $\frac{3}{2}$ for x

$$\frac{7}{2}a = \frac{9}{2} - 5$$

$$\frac{7}{2}a = -\frac{1}{2}$$

$$a = -\frac{1}{7}$$

Plug in and integrate

$$\int \frac{-1}{7(2x-3)} dx + \int \frac{11}{7(x+2)} dx$$

$$\frac{-\ln|2x-3|}{14} + \frac{-11\ln|x+2|}{7} + C$$