ACE Calculus - Mr. Bo - Unit P HW Solutions

1a.

$$x^3 + 5x^2 - 5x - 25$$

$= (x^3 + 5x^2) - (5x + 25)$ $\Rightarrow$ Group terms

$= x^2(x + 5) - 5(x + 5)$ $\Rightarrow$ GCF from each term

$= (x + 5)(x^2 - 5)$ $\Rightarrow$ Pull out GCF

1b.

$$4x(x - 4)^{-3} + 16x^2(x - 4)^{-4}$$

$= 4x(x - 4)^{-4}[(x - 4) + 4x]$ $\Rightarrow$ Pull out GCF

$= \dfrac{4x(5x - 4)}{(x - 4)^4}$ $\Rightarrow$ Simplify

3.

$$\frac{\frac{3}{x} + \frac{4}{x + 1}}{\frac{x}{4}}$$

$= \dfrac{\frac{3}{x} \cdot 4x(x + 1) + \frac{4}{x + 1} \cdot 4x(x + 1)}{\frac{x}{4} \cdot 4x(x + 1)}$ $\Rightarrow$ Multiply through by LCD

$= \dfrac{12(x + 1) + 16x}{x^2(x + 1)}$ $\Rightarrow$ Simplify

$= \dfrac{28x + 12}{x^2(x + 1)}$ $\Rightarrow$ Simplify

$= \dfrac{4(7x + 3)}{x^2(x + 1)}$ $\Rightarrow$ Factor (optional)

5.

$$\frac{5x}{\sqrt{9 + x} - 3}$$

$= \dfrac{5x}{\sqrt{9 + x} - 3} \cdot \dfrac{\sqrt{9 + x} + 3}{\sqrt{9 + x} + 3}$ $\Rightarrow$Multiply by conjugate

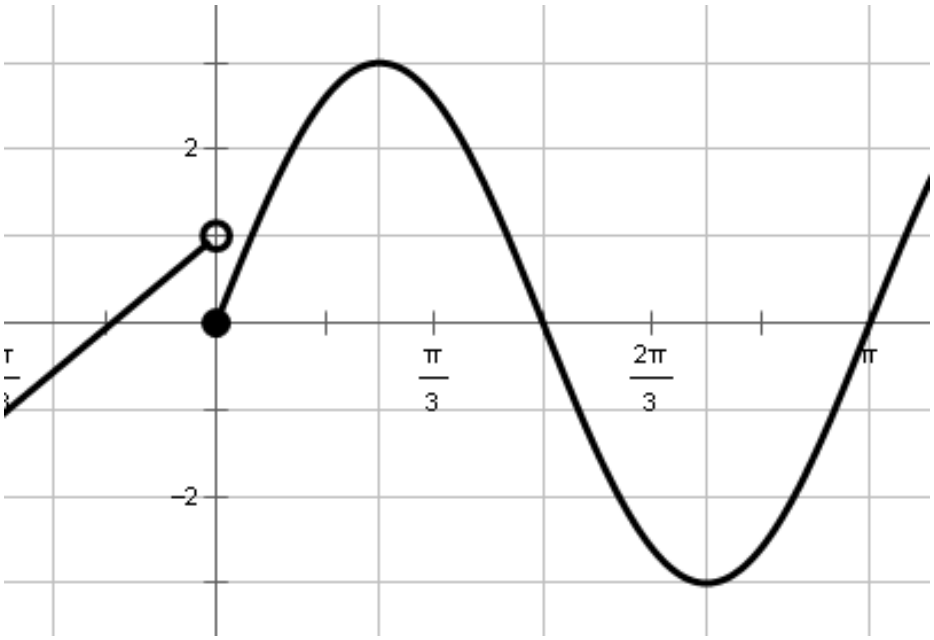
$= \dfrac{5x\left(\sqrt{9 + x} + 3\right)}{(9 + x) - 9}$ $\Rightarrow$Multiply

$= \dfrac{5x\left(\sqrt{9 + x} + 3\right)}{x}$ $\Rightarrow$Simplify

$= 5\left(\sqrt{9 + x} + 3\right)$ $\Rightarrow$Reduce

7.

$f(-1) = -1 \quad f(0) = 0 \quad f(\pi/2) = 0$



9a.

$f(x) = 3x - 1$

$$\frac{f(x) - f(1)}{x - 1} = \frac{(3x - 1) - 2}{x - 1} \quad \Rightarrow \text{Substitute}$$

$$= \frac{3x - 3}{x - 1} \quad \Rightarrow \text{Simplify}$$

$$= \frac{3(x - 1)}{x - 1} \quad \Rightarrow \text{Factor}$$

$$= 3 \quad \Rightarrow \text{Reduce}$$

9b.

$$2\sin(3x)\cos^2(x) - \sin(3x)$$

$$= \sin(3x)[2\cos^2(x) - 1] \quad \Rightarrow \text{Factor}$$

$$= \sin(3x)\cos(2x) \quad \Rightarrow \text{Replace}$$

when $x = \frac{\pi}{12}$:

$$= \sin\left(3 \cdot \frac{\pi}{12}\right)\cos\left(2 \cdot \frac{\pi}{12}\right) \quad \Rightarrow \text{Substitute}$$

$$= \sin\left(\frac{\pi}{4}\right)\cos\left(\frac{\pi}{6}\right) \quad \Rightarrow \text{Simplify}$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} \quad \Rightarrow \text{Evaluate}$$

$= \frac{\sqrt{6}}{4}$ $\Rightarrow$Simplify