AP Calculus AB Mr. Shubleka Quiz: 18

Present neatly on separate paper. Justify for full credit. No Calculators.

Name KEY / SHUBLEKA Score _______ 10 minutes

1.

(a) If $f(x) = x\sqrt{5-x}$, find $f'(x)$.
(b) Find equations of the tangent lines to the curve $y = x\sqrt{5-x}$ at the points $(1, 2)$ and $(4, 4)$.

a) $f'(x) = \sqrt{5-x} + x \cdot \frac{1}{2}(5-x)^{-1/2} \cdot (-1)$

$f'(x) = \sqrt{5-x} - \frac{x}{2\sqrt{5-x}} = \frac{2(5-x)-x}{2\sqrt{5-x}}$

$f'(x) = \frac{10-3x}{2\sqrt{5-x}}$

b) @ $(1,2)$ $\frac{dy}{dx} = f'(1) = \frac{10-3}{2\sqrt{5-1}} = \frac{7}{4}$

$y - 2 = \frac{7}{4}(x-1)$

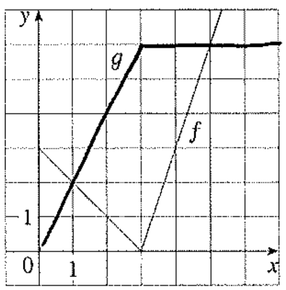
@ $(4,4)$ $\frac{dy}{dx} = f'(4) = \frac{10-4\cdot 3}{2\sqrt{5-4}} = \cancel{8}\ -1$

$\cancel{y-4 = 8(x-4)}$

$y - 4 = -1(x-4)$

2.

If f and g are the functions whose graphs are shown, let $P(x) = f(x)g(x)$, $Q(x) = f(x)/g(x)$, and $C(x) = f(g(x))$. Find (a) $P'(2)$, (b) $Q'(2)$, and (c) $C'(2)$.



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a) $P'(x) = f(x)g'(x) + f'(x)g(x)$

$P'(2) = f(2)g'(2) + f'(2)g(2) = 1 \cdot 2 + (-1) \cdot 4 = -2$

b) $Q'(x) = \frac{g(x)f'(x) - g'(x)f(x)}{[g(x)]^2} \Rightarrow$

$Q'(2) = \frac{g(2)f'(2) - g'(2)\cdot f(2)}{(g(2))^2} = \frac{4(-1) - 2\cdot 1}{4^2} = \frac{-6}{16} = \frac{-3}{8}$

c) $C'(x) = f'(g(x)) \cdot g'(x)$

$C'(2) = f'(g(2)) \cdot g'(2)$

$C'(2) = f'(4) \cdot 2 = 3 \cdot 2 = 6$