

# Homework Solutions (10/18/2013)

①  $F(x) = 2\sin(3x)$  (chain rule)

$$F'(x) = 2\cos(3x)(3)$$

$$F'(x) = \boxed{6\cos(3x)}$$

②  $F(x) = -3x\cos(2x)$  (product rule)

$$F'(x) = -3x(-\sin 2x)(2) + \cos(2x)(-3)$$

$$= 6x\sin 2x - 3\cos 2x$$

$$= \boxed{3(2x\sin 2x - \cos 2x)}$$
 (common factors)

③  $g(x) = 3\cos^2(4x) = 3(\cos 4x)^2$  (chain rule)

$$g'(x) = 6\cos 4x(-\sin 4x)(4)$$

$$g'(x) = \boxed{-24\cos 4x\sin 4x}$$

④  $p(x) = 2\tan(3x)$  (chain rule)

$$p'(x) = 2\sec^2(3x)(3)$$

$$p'(x) = \boxed{6\sec^2(3x)}$$

⑤  $f(x) = x\arccos(x)$  (product rule)

$$f'(x) = x\left(\frac{-1}{\sqrt{1-x^2}}\right) + \arccos(x)(1) = \boxed{\frac{-x}{\sqrt{1-x^2}} + \arccos(x)}$$

⑥  $h(x) = x\sec(2x)$  (product rule)

$$h'(x) = x(\sec 2x \tan 2x)(2) + \sec(2x)(1)$$

$$= 2x\sec 2x \tan 2x + \sec 2x$$

$$= \boxed{\sec 2x(2x \tan 2x + 1)}$$
 (common factors)

⑦  $f(x) = \frac{\cot x}{x}$  (quotient rule)

$$f'(x) = \frac{x(-\csc^2 x) - \cot x(1)}{x^2} = \boxed{\frac{-x\csc^2 x - \cot x}{x^2}}$$

$$\textcircled{10} f(x) = 2 \arcsin\left(\frac{x}{2}\right) \quad (\text{chain rule}) \quad \frac{u'}{\sqrt{1-u^2}}$$

$$f'(x) = 2 \left( \frac{1/2}{\sqrt{1-(\frac{x}{2})^2}} \right) = \frac{1}{\sqrt{1-\frac{x^2}{4}}} = \frac{1}{\sqrt{\frac{4-x^2}{4}}} = \frac{1}{\frac{\sqrt{4-x^2}}{2}} = \frac{2}{\sqrt{4-x^2}}$$

$$\textcircled{12} f(x) = 2\cos^2(7x) + 2\sin^2(7x) \quad (\text{chain rule})$$

$$f(x) = 2[\cos(7x)]^2 + 2[\sin(7x)]^2 \quad (\text{rewrite})$$

$$f'(x) = 4[\cos(7x)](\sin(7x))(7) + 4[\sin(7x)](\cos(7x))(7)$$

$$f'(x) = -28\cos(7x)\sin(7x) + 28\sin(7x)\cos(7x)$$

$$= \boxed{0}$$