# Test 1 Corrections

Matthew Zhang

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## 1 Problem 4

Begin with an expression of the cosine angle addition identity

$$cos(2x + 8x) = cos(2x)cos(8x) - sin(2x)sin(8x)$$

One could notice that through clever use of the cosine angle subtraction identity ($cos(2x - 8x) = cos(2x)cos(8x) + sin(2x)sin(8x)$) the cosine terms on the right hand side could be eliminated, as follows:

$$cos(2x+8x)-cos(2x-8x) = cos(2x)cos(8x)-sin(2x)sin(8x)-[cos(2x)cos(8x)+sin(2x)sin(8x)]$$

Simplifying yields

$$cos(2x + 8x) - cos(2x - 8x) = -2sin(2x)sin(8x)$$

$$\frac{-cos(2x + 8x) + cos(2x - 8x)}{2} = sin(2x)sin(8x)$$

## 2 Problem 5

$$\int sin^{11}x\ cos^6x\ dx$$

$$\int sinx\ (1 - cos^2x)^5\ cos^6x\ dx$$

$$u = cosx$$

$$du = -sinx\ dx$$

$$-\int (1 - u^2)^5\ u^6\ du$$

$$-\int (1 - 5u^2 + 10u^4 - 10u^6 + 5u^8 - u^{10})\ u^6\ du$$

$$-\int (u^6 - 5u^8 + 10u^{10} - 10u^{12} + 5u^{14} - u^{16})\ du$$

$$-(\frac{u^7}{7} - \frac{5u^9}{9} + \frac{10u^{11}}{11} - \frac{10u^{13}}{13} + \frac{u^{15}}{3} - \frac{u^{17}}{17}) + C$$

$$-\frac{u^7}{7} + \frac{5u^9}{9} - \frac{10u^{11}}{11} + \frac{10u^{13}}{13} - \frac{u^{15}}{3} + \frac{u^{17}}{17} + C$$

$$-\frac{cos^7x}{7} + \frac{5cos^9x}{9} - \frac{10cos^{11}x}{11} + \frac{10cos^{13}x}{13} - \frac{cos^{15}x}{3} + \frac{cos^{17}x}{17} + C$$

## 3 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

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

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