

# FAMAT STATE BOWL

1.  $S'(x) = 2 - 2x \sin(x^2)$   $S''(x) = -2x \cos(x^2) \cdot 2x + 2 \sin(x^2)$  8
2.  $\frac{1}{2} (S(x) + x^2)^{-1/2} [S'(x) + 2x]$   $S(1) = 1$   $S'(1) = -4$   $\frac{1}{2} \cdot \frac{1}{\sqrt{2}} \cdot -2 = -\frac{1}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$
3.  $A = 2[3 + 8 + 15 + 20 + 26]$   $B = 2[8 + 15 + 20 + 26 + 32]$   
 $C = 2[5 + 11 + 17 + 22 + 30]$   $144 + 202 + 170 = 516$
4.  $\pi \int_0^1 [(5-x^3)^2 - (1-\cos x)^2] dx = 85.031$
5. **B, C, D, E, F**
6.  $\frac{m}{m} = \frac{1}{4}$   $-4 = 4a + 2b$   $10 = 4a + b$   $14 = -b$   $10 = 4a - 14$   
 $\frac{m}{m} = -\frac{1}{4}$   $S''(x) = 2ax + b$   $-4 = 4a + 2b$   $b = -14$   $24 = 4a$   $a = 6$   
 $S'(x) = 6x^2 - 14x$   $S'(1) = -8$
7.  $A = \frac{1}{5} \int_7^{12} \frac{1}{20} t(t-12)(24-t) dt = -16.438$   $B = 12$   
 $C = 33.255$   $D = \frac{T(13) - T(6)}{7} = 5.650$  34.467
8.  $A(w) = \int_0^w (36x^2 - 18x^3) dx$   
 $\frac{dA}{dw} = (36w^2 - 18w^3) \frac{dw}{dw} = (36(.5)^2 - 18(.5)^3)(.04) = .27$
9.  $\int_0^{6.1978908} (4 \ln x - (1.5x - 2)) dx = 6.81412764$   
 $\int_0^{1.53478516} (2 \cos x - e^x) dx = .31226518$  .046
10.  $(2, 0)$   $4x^3 + x \sec^2 y + \tan y = 0$   $16x + y = 32$   
 $32 + 2y + 0 = 0$   $\frac{m}{m} = -16$   $14(2.1) + y = 32$  -1.6
11.  $\int_{-4}^2 [(x+2)^2 - 2] dx - \int_{-2}^0 x dx + \int_0^{\pi/4} \tan x dx + \int_{\pi/4}^{\pi} e^{-x} dx = 12.943$
12. A) T B) F C) F (limits) D) T E) T F) F  $4 + \ln 8$
13.  $S(x) = 2x(16-x^2) = 32x - 2x^3$   $S'(x) = 32 - 6x^2$   $16 - 3x^2 = 0$   
 $x = \sqrt{16/3} = \frac{4}{\sqrt{3}}$   $2 \left( \frac{4\sqrt{3}}{3} \right) \left( 16 - \frac{16}{3} \right) = \frac{8\sqrt{3}}{3} \cdot \frac{32}{3} = \frac{256\sqrt{3}}{9}$
14.  $\int_1^5 x dx = \left| \frac{x^2}{2} \right|_1^5 = \frac{25}{2} - \frac{1}{2} = \frac{24}{2} = 12$   $\frac{124}{3} + 6 = \frac{142}{3}$   
 $+ \int_1^5 (35(x) + x + 4) dx = 9 + \int_1^5 (-x + 4) dx = 13$   $\frac{142}{3} + 13 = \frac{181}{3}$
15.  $\int_{-2}^2 (y^3 + 2y + 4) - (y^2 - 2y) dy = \frac{\pi}{6}$