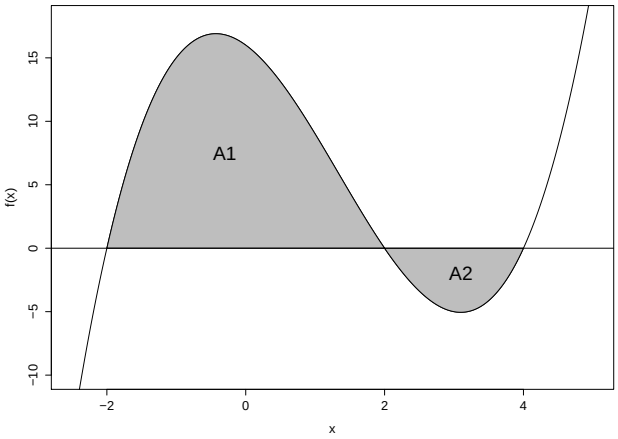
MA 23200 - Practice Exam 1

1. The graph of $y = f(x)$ is shown in the figure below. $A1$ and $A2$ are positive numbers that represent the area of the shaded regions from -2 to 2 and from 2 to 4 respectively. In terms of $A1$ and $A2$, $\int_{-2}^{2} f(x)\mathrm{d}x - 2\int_{2}^{4} f(x)\mathrm{d}x =$



A. $A1 - A2$
B. $A1 + A2$
C. $A1 + 2A2$
D. $A1 - 2A2$
E. $2A1 + A2$

2. $\int_{2}^{5} \dfrac{x^2+1}{x^3+3x}dx =$

A. $\dfrac{1}{3}\ln 10$
B. $\ln 10$
C. $3\ln 10$
D. $\dfrac{1}{3}\ln 126$
E. $\ln 126$

3. $\int_0^{5\pi/6} 3x\cos x dx =$

A. $\frac{5\pi}{4} - 3 + \frac{3\sqrt{3}}{2}$

B. $\frac{5\pi}{4} - 3 - \frac{3\sqrt{3}}{2}$

C. $\frac{5\pi}{4} + 3 - \frac{3\sqrt{3}}{2}$

D. $-\frac{5\pi}{4} - 3 - \frac{3\sqrt{3}}{2}$

E. $-\frac{5\pi}{4} - 3 + \frac{3\sqrt{3}}{2}$

4. $\int (x^3+8)e^{2x}dx =$

A. $\frac{1}{2}(x^3+8)e^{2x} + \frac{3}{4}x^2e^{2x} + \frac{3}{4}xe^{2x} + \frac{3}{8}e^{2x} + C$

B. $\frac{1}{2}(x^3+8)e^{2x} - \frac{3}{4}x^2e^{2x} + \frac{3}{4}xe^{2x} - \frac{3}{8}e^{2x} + C$

C. $2(x^3+8)e^{2x} - 12x^2e^{2x} + 48xe^{2x} - 96e^{2x} + C$

D. $(x^3+8)e^{2x} - 3x^2e^{2x} + 6xe^{2x} - 6e^{2x} + C$

E. $(x^3+8)e^{2x} + 3x^2e^{2x} + 6xe^{2x} + 6e^{2x} + C$

5. $\int_1^3 (x+1)^2 \ln(x) dx =$

A. $12\ln 3 - \frac{109}{9}$

B. $15\ln 3 - \frac{80}{9}$

C. $15\ln 3 - \frac{109}{9}$

D. $21\ln 3 - \frac{80}{9}$

E. $21\ln 3 - \frac{109}{9}$

6. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos\theta}{\sqrt{1+\sin\theta}} \mathrm{d}\theta$.

A. $-2(\sqrt{2}-1)$

B. $-2\sqrt{2}$

C. $2\sqrt{2}$

D. $2(\sqrt{2}-1)$

E. $2(\sqrt{2}+1)$

7. A typist's speed over a four minute interval is given by $W(t) = \dfrac{20e^t}{t+1}, 0 \leq t \leq 4$. Use the Trapezoid Rule and $n = 2$ to approximate the number of words typed during the third minute (from $t = 2$ to $t = 3$). Round your answer to the nearest integer.

   A. 55 words
   B. 72 words
   C. 85 words
   D. 97 words
   E. 110 words

8. Find the volume of the solid generated by revolving the region under the graph of $y = \dfrac{7}{\sqrt{x+2}}$ from $x = 1$ to $x = 5$ about the x-axis.

   A. $\displaystyle\int_1^5 \frac{7\pi}{\sqrt{x+2}}\mathrm{d}x$
   B. $\displaystyle\int_1^5 \frac{7\pi}{x+2}\mathrm{d}x$
   C. $\displaystyle\int_1^5 \frac{49\pi^2}{x+2}\mathrm{d}x$
   D. $\displaystyle\int_1^5 \frac{49\pi}{\sqrt{x+2}}\mathrm{d}x$
   E. $\displaystyle\int_1^5 \frac{49\pi}{x+2}\mathrm{d}x$

9. Find the volume of the solid whose cross sections are semicircles with diameter $4x$ from $x = 0$ to $x = 3$.

   A. 72π
   B. 144π
   C. 12π
   D. 36π
   E. 18π

10. $\int_1^\infty \frac{4}{(2+t)^2} dt =$

   A. The integral diverges.
   B. 4
   C. -4
   D. $\frac{4}{3}$
   E. $-\frac{4}{3}$

11. Suppose a nuclear accident causes plutonium to be released into the atmosphere. The amount of plutonium that has been released at time a is given by $\int_0^a 3e^{-2t}dt$. What is the total amount of energy that will be given off over all time?

A. $\frac{3}{2}(1-e^{-2a})$
B. ∞
C. $\frac{3}{2}$
D. 3
E. 6

12. For $f(x,y) = \frac{(x+\frac{1}{4})\tan y}{y}$, find $f(\frac{3}{4}, \frac{\pi}{6})$.

A. $\frac{\sqrt{3}\pi}{3}$
B. $\frac{6\sqrt{3}}{\pi}$
C. $\frac{\sqrt{3}\pi}{6}$
D. $\frac{2\sqrt{3}}{\pi}$
E. $\frac{\sqrt{3}\pi}{18}$