

Your Name:

Instructor: Steven Clontz

Circle the letter for your final answer. Show your work. Calculators are not allowed.

1. Evaluate $\int 2x^3 - 7x + e^x + 1 dx$.

a) $x^4 - \frac{7}{2}x^2 + \frac{1}{x+1}e^{x+1} + 2x + C$

b) $\frac{1}{2}x^4 - 7x^2 + e^x + x + C$

c) $\frac{1}{4}x^4 - 7x^2 + x + e^{x+1} + C$

d) $\frac{1}{2}x^4 - \frac{7}{2}x^2 + e^x + x + C$

e) $\frac{1}{2}x^4 - \frac{7}{2}x^2 + \frac{1}{x+1}e^{x+1} + x + C$

2. Which of these is an antiderivative of $2\sqrt{x} - \frac{4}{x}$?

a) $3\sqrt{x^3} - 4 \ln |x| + 2 \ln 3$

b) $x^{1/2} - 4 \ln x + 3$

c) $3x^{3/2} + \frac{4}{x^2}$

d) $\sqrt{x^3} + 4 \ln |x| + x$

e) $3\sqrt{x^3} + \frac{2}{x^2} - \pi$

3. Evaluate $\int_{1/2}^{\sqrt{3}/2} \frac{1}{\sqrt{1-x^2}} dx$.

- a) π b) $\frac{\pi}{6}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{3}$ e) $\frac{\pi}{2}$
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4. Find $\frac{d}{dx} \left[\int_9^{x^2} e^{t^2} dt \right]$.

- a) $e^{x^4} - e^{81}$ b) $2xe^{t^2}$
c) $x^2e^{x^4} - 9e^8$ d) $2xe^{x^4}$ e) $2xe^{x^4} - e^{81}$
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5. Suppose $f'(t) = t^2 - 7$ and $f(3) = -10$. Find $f(t)$.

a) $f(t) = \frac{t^3}{3} - 7t + 2$ b) $f(t) = \frac{t^3}{3} - 7t + C$

c) $f(t) = \frac{t^3}{3} - 7t - 10$ d) $f(t) = \frac{t^3}{3} + 7t - 40$ e) $f(t) = \frac{t^3}{3} + 7t - 10$

6. Evaluate $\int 2x^3 \cos(x^4) dx$.

a) $\frac{1}{2} \cos(x^4) + C$ b) $\frac{1}{2} \sin(x^4) + C$

c) $\frac{1}{2} x^4 \sin\left(\frac{1}{5} x^5\right) + C$ d) $\frac{1}{3} \sin(x^4/5) + C$ e) $\frac{1}{4} x^3 \cos(x^4) + C$

7. Evaluate $\int \frac{x^2 + 1}{\sqrt{x}} dx$. (Hint: Don't try substitution...)

a) $\frac{1}{2}\sqrt{x} - \frac{1}{2}x^{-3/2} + C$ b) $\frac{x^3 + x}{x} + C$

c) $\frac{2}{5}x^{5/2} + 2\sqrt{x} + C$ d) $\frac{2}{3}x^{3/2} + 2x^{-1/2} + C$ e) $\frac{x}{(1/2)x^{-1/2}} + C$

8. Recall that "net area" is the total area above the x-axis subtracted by the total area under the x-axis. Find the net area bounded by the curve $y = 3x^2 - 3$ and the x-axis from $x = -2$ to $x = 1$.

a) -4 b) 0 c) 4 d) 8 e) 16

9. (Worth double.) Find the total area bounded by the curve $y = 3x^2 - 3$ and the x-axis from $x = -2$ to $x = 1$.

- a) -4 b) 0 c) 4 d) 8 e) 16
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10. ★Changed from original★ (Worth double.) Evaluate $\int_0^1 \frac{3\sqrt{s}}{(1+s^{3/2})^2} ds$.

- a) 0 b) 1 c) 2 d) 3 e) 4
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11. (Worth double.) Find the total area bounded by the curves $g(x) = 6x^3 - 24x + 1$ and $h(x) = 8x - 2x^3 + 1$.

- a) 0 b) 8 c) 16 d) 32 e) 64
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12. (Worth double.) $g'(x) = 6(3x^2 + 4x)(x^3 + 2x^2 - 1)^5$ and $g(0) = 3$. Find $g(x)$.

a) $g(x) = (x^3 + 2x^2 - 1)^6 + 2$ b) $g(x) = (3x^2 + 4x)^6 + 2$

c) $g(x) = (x^3 + 2x^2 - 1)^6 - 2$ d) $g(x) = (3x^2 + 4x)^6 - 2$ e) $g(x) = (x^3 + 2x^2)^6$
