Name: _____     Score: _____ /100

> Please show **all** your work! Answers without supporting work will not be given credit.
> Write answers in spaces provided. You have 50 minutes to complete this exam.

1. (6 points) Compute a Riemann sum using left end points and 4 approximating rectangles for the function $f(x) = x - 3$ on the interval $[0, 4]$

Answer:_____

2. (4 points) Write the limit definition of the definite integral of the function $f(x) = x^2 - 2$ on the interval $[2, 5]$, using the standard test values and regular intervals. **Do not compute**.

Answer:_____

3. (6 points) Express the area of the shaded region in terms of definite integrals of the function $f$ whose graph is given below.
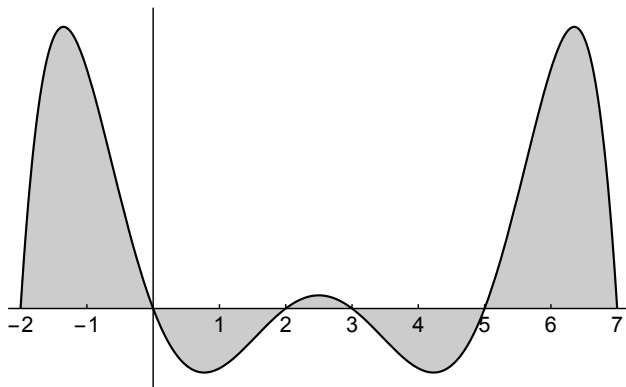


Answer:_____

4. (10 points) Assume $\int_2^6 f(x)\,dx = 2$ and $\int_2^6 g(x)\,dx = 10$. Compute the following integrals, if possible. **If not enough information is given to compute an integral, indicate this**.

(a) $\displaystyle\int_2^6 \frac{f(x)}{g(x)}\,dx =$

Answer:_____

(b) $\displaystyle\int_2^6 [f(x) - g(x)]\,dx =$

Answer:_____

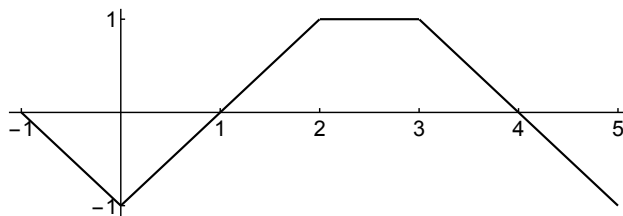(c) $\displaystyle\int_2^6 [3f(x) + 1]\,dx =$

Answer:_____

(d) $\displaystyle\int_2^6 4\,[f(x) \cdot g(x) + f(x)]\,dx =$

Answer:_____

5. (8 points) Find the function $f(x)$ such that $f'(x) = 8x^3 - 10x + 6$ and $f(1) = -4$.

Answer:_____

6. (8 points) The graph of a function $f$ on the interval $[-1, 5]$ is given below



Let $g$ be the function defined by $g(x) = \int_{-1}^{x} f(t)\, dt$. Compute the following values:

[Hint: Write out what g(x) is]

(a) $g(5) =$

Answer:_____

(b) $g(-1) =$

Answer:_____

(c) $g'(1) =$

Answer:_____

(d) $g'(2) =$

Answer:_____

7. (4 points) Let $h$ be the function defined by $h(x) = \int_{-x}^{x} f(t)\, dt$. Find $h'(x)$.

[Hint: Note the bounds of integration.]

Answer:_____

8. (26 points) Compute the following indefinite integrals.

(a) $\int \left[ \dfrac{1}{\sqrt{x}} + x^{-4} + 2\cos x - 9 \right] dx$

Answer:_____

(b) $\int 5(x^4 + 2x)(x^5 + 5x^2 + 7)^6 \, dx$

Answer:_____

(c) $\int (\sin x)\sqrt{3 + 4\cos x} \, dx$

Answer:_____

(d) $\int \dfrac{1}{x^3} \sin\left(\dfrac{1}{x^2}\right) dx$

Answer:_____

9. (12 points) Compute the following definite integrals.

   (a) $\displaystyle\int_1^3 (4x + 2)\, dx$

   Answer:_____

   (b) $\displaystyle\int_0^{\pi/2} \sin^7(x) \cos(x)\, dx$

   Answer:_____

10. (8 points) A particle is moving in a straight line with velocity $v(t) = 2t + 3\sqrt{t}$. Find the average velocity of the particle between time $t = 1$ and time $t = 9$.

    Answer:_____

11. (8 points) Find the area of the region bounded by the curves $y = 1 - x^2$ and $y = x$ and the lines $x = 0$ and $x = 2$.

    Answer:_____

The End.