Calculus Web Assignments

Web Assignments are intended to be completed with a partner. Both partners should individually work each of the problems, followed by a collaborative discussion about the problem.

Both partners are required to participate in the "Honor-System" Grading of the Web Assignment.

Calculus: Web Assignment #21

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. Find the derivative of the function $f(x) = \dfrac{2}{\sqrt[3]{x}} + 3\cos x$.

a. $f'(x) = \dfrac{2}{3x^{4/3}} - 3\sin x$

b. $f'(x) = -\dfrac{2}{3x^{4/3}} - 3\sin x$

c. $f'(x) = -\dfrac{2}{3x^{4/3}} + 3\sin x$

d. $f'(x) = -\dfrac{2}{3x^{3/4}} - 3\sin x$

e. $f'(x) = -\dfrac{2}{3x^{3/4}} + 3\sin x$

____ 2. Find the solution of the differential equation $\dfrac{dr}{dt} = \dfrac{\sec^2 t}{\tan t + 1}$ which passes through the point $(\pi, 5)$.

a. $r = \ln|\tan t + 1| + 5$

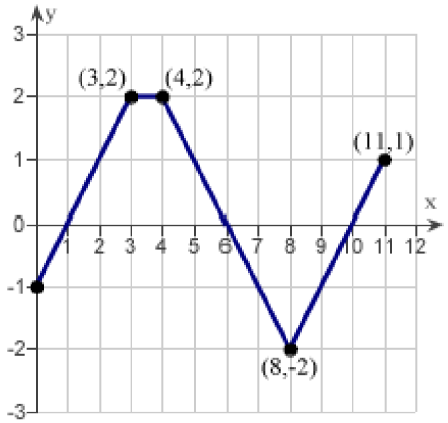
b. $r = 2\ln|\sec t + 1|$

c. $r = \ln|\tan t + 1|$

d. $r = 5\ln|\tan t + 1|$

e. $r = 2\ln|\sin t| + 5$

____ 3. The graph of f consists of line segments, as shown in the figure. Evaluate the definite integral $\int_0^{11} f(x)\,dx$ using geometric formulas.



a. 4
b. 3
c. 1
d. 2
e. 5

____ 4. Find the vertical asymptotes (if any) of the function $f(x) = \dfrac{x^2 - 4}{x^2 + 3x + 2}$.

a. $x = 2$
b. $x = -1$
c. $x = 1$
d. $x = -2$
e. $x = -2$

____ 5. Sketch the graph of the function $f(x) = \begin{cases} 10x - 25 & 0 \le x \le 5 \\ x^2 & 5 \le x \le 8 \end{cases}$ and locate the absolute extrema of the function on the interval $[0, 8]$.

a. left endpoint: $(0, -25)$ absolute minimum
right endpoint: $(5, 25)$ absolute maximum

b. left endpoint: $(0, -25)$ absolute minimum
right endpoint: $(8, 55)$ absolute maximum

c. left endpoint: $(5, 25)$ absolute minimum
right endpoint: $(8, 64)$ absolute maximum

d. left endpoint: $(0, 0)$ absolute minimum
right endpoint: $(8, 64)$ absolute maximum

e. left endpoint: $(0, -25)$ absolute minimum
right endpoint: $(8, 64)$ absolute maximum

____ 6. Find the derivative of the function.

$f(x) = x^8 \sqrt{5 - 3x}$

a. $f'(x) = \dfrac{x^7(5 - 51x)}{2\sqrt{5 - 3x}}$

b. $f'(x) = \dfrac{x^7(80 - 3x)}{2\sqrt{5 - 3x}}$

c. $f'(x) = \dfrac{x^7(80 + 51x)}{2\sqrt{5 - 3x}}$

d. $f'(x) = \dfrac{x^7(5 + 3x)}{2\sqrt{5 - 3x}}$

e. $f'(x) = \dfrac{x^7(80 - 51x)}{2\sqrt{5 - 3x}}$

____ 7. For the function $f(x) = 4x^3 - 48x^2 + 6$:

(a) Find the critical numbers of f (if any);
(b) Find the open intervals where the function is increasing or decreasing; and
(c) Apply the First Derivative Test to identify all relative extrema.

Then use a graphing utility to confirm your results.

a. (a) $x = 0$, 2
(b) increasing: $(-\infty, 0) \cup (2, \infty)$; decreasing: $(0, 2)$
(c) relative max: $f(0) = 6$; relative min: $f(2) = -154$

b. (a) $x = 0$, 2
(b) decreasing: $(-\infty, 0) \cup (2, \infty)$; increasing: $(0, 2)$
(c) relative min: $f(0) = 6$; relative max: $f(2) = -154$

c. (a) $x = 0$,2
(b) increasing: $(-\infty, 0) \cup (2, \infty)$; decreasing: $(0, 2)$
(c) relative max: $f(0) = 6$; no relative min.

d. (a) $x = 0$, 8
(b) increasing: $(-\infty, 0) \cup (8, \infty)$; decreasing: $(0, 8)$
(c) relative max: $f(0) = 6$; relative min: $f(8) = -1018$

e. (a) $x = 0$,8
(b) decreasing: $(-\infty, 0) \cup (8, \infty)$; increasing: $(0, 8)$
(c) relative min: $f(0) = 6$; relative max: $f(8) = -1018$

____ 8. Find $F'(x)$ given $F(x) = \int_1^{6x} \frac{7}{t}\, dt$.

a. $F'(x) = \frac{13}{x}$
b. $F'(x) = \ln|7x|$
c. $F'(x) = \frac{6}{x}$
d. $F'(x) = \ln|6x|$
e. $F'(x) = \frac{7}{x}$

____ 9. Find the general solution of the differential equation below and check the result by differentiation.

$$\frac{dY}{du} = \frac{9}{4}u^{\frac{5}{4}}$$

a. $Y(u) = \frac{45}{16}u^{\frac{9}{4}} + C$

b. $Y(u) = u^{\frac{9}{4}} + C$

c. $Y(u) = \frac{45}{16}u^{\frac{1}{4}} + C$

d. $Y(u) = \frac{9}{4}u^{\frac{9}{4}} + C$

e. $Y(u) = u^{\frac{9}{4}}$

____ 10. Find the limit (if it exists).

$$\lim_{\Delta x \to 0} \frac{(x+\Delta x)^2 - 9(x+\Delta x) + 2 - \left(x^2 - 9x + 2\right)}{\Delta x}$$

a. $\frac{1}{3}x^3 - \frac{9}{2}x^2 + 2x$

b. $2x - 9$

c. $x^3 - 9x^2 + 2x$

d. $x^2 - 9x + 2$

e. does not exist