**1.** (1 point) Use linear approximation to estimate the amount of paint in cubic centimeters needed to apply a coat of paint 0.040000 cm thick to a hemispherical dome with a diameter of 80.000 meters.

________

*Correct Answers:*

- `2*pi*4000^2*0.04`

**2.** (1 point) Let $y = 4x^2 + 4x + 4$.
Find the differential $dy$ when $x = 2$ and $dx = 0.3$ ________
Find the differential $dy$ when $x = 2$ and $dx = 0.6$ ________

*Correct Answers:*

- `6`
- `12`

**3.** (1 point) Let $y = \tan(2x + 2)$.
Find the differential $dy$ when $x = 3$ and $dx = 0.2$ ________
Find the differential $dy$ when $x = 3$ and $dx = 0.4$ ________

*Correct Answers:*

- `18.8944303497021`
- `37.7888606994042`

**4.** (1 point) Let $y = 3x^2$.
Find the change in $y$, $\Delta y$ when $x = 5$ and $\Delta x = 0.2$ ________
Find the differential $dy$ when $x = 5$ and $dx = 0.2$ ________

*Correct Answers:*

- `6.12`
- `6`

**5.** (1 point) Let $y = 2\sqrt{x}$.
Find the change in $y$, $\Delta y$ when $x = 5$ and $\Delta x = 0.2$ ________
Find the differential $dy$ when $x = 5$ and $dx = 0.2$ ________

*Correct Answers:*

- `0.0885657453969726`
- `0.0894427190999916`

**6.** (1 point) Find the linear approximation at $x = 0$ to $\frac{1}{\sqrt{7-x}}$.
Write your answer in the form $y = Ax + B$.

________

*Correct Answers:*

- `y-0.0269975*x = 0.377964`

**7.** (1 point) Let $f(x) = \dfrac{x-6}{x+6}$. Find the open intervals on which $f$ is increasing (decreasing). Then determine the $x$-coordinates of all relative maxima (minima).

1. $f$ is increasing on the intervals ________
2. $f$ is decreasing on the intervals ________
3. The relative maxima of $f$ occur at $x =$ ________
4. The relative minima of $f$ occur at $x =$ ________

**Notes:** In the first two, your answer should either be a single interval, such as (0,1), a comma separated list of intervals, such as (-inf, 2), (3,4), or the word "none".

In the last two, your answer should be a comma separated list of $x$ values or the word "none".

*Correct Answers:*

- `(-infinity,-6), (-6,infinity)`
- `NONE`
- `NONE`
- `NONE`

**8.** (1 point) For $x \in [-10, 12]$ the function $f$ is defined by

$$f(x) = x^3(x+1)^4$$

On which two intervals is the function increasing (enter intervals in ascending order)?
____ to ____
and
____ to ____

Find the region in which the function is positive: ____ to ____

Where does the function achieve its minimum? ____

*Correct Answers:*

- `-10`
- `-1`
- `-0.428571428571429`
- `12`
- `0`
- `12`
- `-10`

**9.** (1 point) Find the absolute maximum and absolute minimum values of the function

$$f(x) = x^4 - 6x^2 - 7$$

on each of the indicated intervals.

(a) Interval = $[-3, -1]$.
1. Absolute maximum = ________
2. Absolute minimum = ________

(b) Interval = $[-4, 1]$.
1. Absolute maximum = ________
2. Absolute minimum = ________

(c) Interval = $[-3, 4]$.
1. Absolute maximum = ________
2. Absolute minimum = ________

*Correct Answers:*

- `20`
- `-16`
- `153`

- -16
- 153
- -16

---

**10.** (1 point) Find the absolute maximum and absolute minimum values of the function

$$f(x) = x^3 + 6x^2 - 63x + 2$$

over each of the indicated intervals.

(a) Interval = $[-8, 0]$.

1. Absolute maximum = ______
2. Absolute minimum = ______

(b) Interval = $[-5, 4]$.

1. Absolute maximum = ______
2. Absolute minimum = ______

(c) Interval = $[-8, 4]$.

1. Absolute maximum = ______
2. Absolute minimum = ______

*Correct Answers:*

- 394
- 2
- 342
- -106
- 394
- -106